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ABSTRACT

The solid waste problem is so pervasive that it can no longer be ignored. The purpose of this set of materials is to encourage a lifestyle that includes the use of the three R's: Reduce, Reuse, Recycle. It was designed to educate upper elementary and junior high school students who may educate their classmates, families, and community about the solid waste issue, its causes and solutions. The curriculum may be adapted to a variety of school grade levels. This curriculum is divided into four main sessions. Session I defines the solid waste problem; session II provides an investigation of the underlying causes of the waste problem; session III examines waste in people's lives; and session IV encourages solutions. Background information is provided for each, followed by a detailed description of the activities used in the 2-hour classroom presentations. Interdisciplinary follow-up activities are suggested. Worksheets and hand-outs are found at the end of each chapter. Additional information, including a pre/post survey, the role of the teacher and volunteers, a booklet to send to families, a sample letter, and how to organize a school recycling program and a trash festival are found in the appendices. (CW)

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Waste Away

Information and Activities for Investigating Trash Problems and Solutions

[illegible]

Waste Away

A Curriculum on Solid Waste

designed to reach upper elementary and junior high school students, their schoolmates, families, and communities.

by the

Vermont Institute of Natural Science

Bonnie L. Ross, Project Director

Printed on Recycled Paper

Vermont Institute of Natural Science, P.O. Box 86, Woodstock, VT 05091
(802) 457-2779

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Waste Away exists because so many people care about the quality of our environment. The knowledge that many people working together can make a difference is what inspired the creation of this program.

Bonnie L. Ross

Bonnie Ross
Waste Away Project Director

INTRODUCTION

THE PURPOSE OF WASTE AWAY

The solid waste problem is so pervasive that we can no longer ignore its origin--our wasteful lifestyles. The purpose of Waste Away is to encourage a lifestyle that includes the three R's: Reduce, Reuse, Recycle. Waste Away is designed to educate upper elementary and junior high school students who will, in turn, educate their schoolmates, families and community about the solid waste issue, its causes and solutions. This curriculum may be easily adapted to a variety of grade levels.

THE FORMAT OF WASTE AWAY

Waste Away is divided into four main sessions. Session I defines the waste problem. Session II investigates underlying causes. Session III examines the waste in our lives. Session IV encourages solutions. Background information is provided for each, followed by a detailed description of the sequenced activities used in the two-hour classroom presentations. Interdisciplinary follow-up activities are suggested by category--"In Class", "In The School", "In The Community", "At Home" and "For The Festival"--so that children can reinforce what they have learned while sharing valuable knowledge. Worksheets and other handouts are found at the back of each chapter. Additional information, including a pre/post survey, the role of the teacher and volunteers, a booklet to send to families, a sample letter, and how to organize a school recycling program and a trash festival, are found in the Appendices. It is recommended that the Appendices be read before conducting Session I.

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WASTE DEFINED

Solid Waste

Solid waste is any unwanted material, solid or semisolid, that is discarded by individuals, industries or communities. The two key words in this definition are "unwanted" and "discarded." Although certain materials may be "unwanted" and considered "waste" by one person (industry or community), they may be greatly appreciated and considered valuable resources by another. The word "discarded" is another important element of the definition of solid waste, because the questions of where and how our waste should be discarded are growing more critical every day.

Types of Solid Waste

Part of the difficulty involved in determining where and how our waste should be discarded stems from the fact that we produce a number of different types of solid waste. Much of our waste is organic or biodegradable. Microorganisms (fungi and bacteria) are able to recycle the components of biodegradable waste back into the earth's soil via the process of decomposition. Some waste is degradable through chemical breakdown. Nails, for instance, will rust. Some of our waste is nonbio-

degradable; some is not chemically degradable; neither time nor nature's elements will ever make such trash disappear. Some synthetic materials, such as plastics, take so long to decompose (due to their molecular structure) that they are considered nonbiodegradable. A portion of the nonbiodegradable waste, however, is recyclable. With the aid of existing technologies, we are able to rework the ingredients of used items into new and usable products. (For more information about types of waste, see Session I, "Meet the Trash" activity and vocabulary, p.5)

THE GENERATION OF WASTE--A GROWING PROBLEM

The generation of waste is a growing American problem. As the United States' population grows, so does its production of waste per person. In the last 50 years, the amount of waste generated by each person in the United States has doubled.[1] *The U.S. Environmental Protection Agency (EPA) expects America's waste generation to increase 20 percent in the next ten years.*[2] *The combination of a growing population and increased waste generation per person spells trouble--trouble for individuals, families, communities and the nation as a whole.*

Individual Waste Generation

"Factories, office buildings, retail stores--they're the ones producing large amounts of waste, not me, a mere individual." That's a commonly held misconception. The average American actually discards about 3½ pounds of trash in a single day.[3] *It may not seem like a lot of trash we put at our curb each week, but multiply that trash bag's worth by all the trash bags travelling to the landfill this week, or all the weeks of the year, or all the people in the United States, and we can see that, indeed, we, as individuals, create a great deal of trash.*

Municipal Waste Generation

The job of municipal trash collection and disposal is a growing one. As the supply of available landfill space diminishes, the fees charged for dumping waste continue to rise. In some areas, especially the Northeast, the fees towns must pay for dumping their waste have doubled and even tripled in a single year.[4]

National Waste Generation

The United States produces more waste than any other nation in the world.[5] Each day Americans discard an amount of waste which could fill one hundred thousand garbage trucks. If that many trucks were lined up on a highway, the line would reach from Chicago to New York.[6] Many people in other less wealthy nations would be grateful to use what we Americans regard as waste--outgrown clothes, repairable household items, valuable metals, edible foods, etc.

THE EFFECTS OF WASTE

The effects of our nation's and other's boundless generation of waste are numerous and far-reaching. One of the most obvious effects is the fact that we are running out of places to dispose of our trash. Landfills and dumps are filling up, and it's growing more and more difficult to find land where we can build new landfills. The collection and disposal of such large quantities of waste consume a tremendous amount of energy, most of which comes from nonrenewable energy sources. The financial cost of solid waste disposal is also great; at $6 billion per year, it is our nation's third largest domestic expenditure.[7] Additionally, for each item we discard (instead of continuing its life via repairing, reusing or recycling it), we also sacrifice the valuable, and often limited, natural resources from which that item was created. Air and water pollution are still other effects of our wasteful ways. Landfills and dumps may leak toxic liquids into our water supplies. Incinerators may spew dangerous metals and chemicals into the air we breathe, as well as contribute hazardous wastes to our landfills.

Finally, we must realize that the damage caused by waste is by no means limited to humans. Important plant communities and wildlife habitats are lost to our waste each day. Many wild animals are injured or killed by our waste. For example, sea turtles often mistake floating plastic bags for jelly fish; the bags clog their digestive tracts and so block the absorption of food. This eventually leads to starvation. Small rodents like mice and chipmunks may be trapped in or cut by glass bottles. Hazardous chemicals may harm wildlife by poisoning the food they eat; predators at the top of the *food chain are particularly vulnerable to the accumulation of toxins. The harmful effects of our waste may touch every wildlife habitat.*

NOT IN MY BACKYARD

"Not in my backyard!" That's our response to the solid waste disposal question. But alternatives are needed. Changes in current waste generation habits and disposal strategies are critical. People like you, together with the children you teach, can help to initiate those necessary changes. You can help others to learn more about the solid waste issue, to better understand its complications and challenges and to work toward solutions.

NOTES

1. A-way with Waste, Washington State Dept. of Ecology, Litter Control and Recycling Program, 4350 150th Ave., Redmond, WA, 98052, 1985.

2. National Wildlife Federation's Conservation 89, 1400 Sixteenth St. N.W., Washington, DC, 20036-2266, August 24, 1989.

3. Wilcox, Charlotte, Trash, Minneapolis, MN: Carolrhoda Books, Inc., 1988.

4. A-way with Waste, Washington State Dept. of Ecology, Litter Control and Recycling Program, 4350 150th Ave., Redmond, WA, 98052, 1985.

5. O'Leary, Phillip and Patrick W. Walsh and Robert L. Helm, "Managing Solid Waste", Scientific American, December, 1988.

6. Wilcox, Charlotte, Trash, Minneapolis, MN: Carolrhoda Books, Inc., 1988.

7. Earth Care Paper Company, Catalog, Madison, WI, 53704, 1988.

WASTE--WHAT IS IT?

SESSION I

Focus: *Significant problems are caused by the amount of solid waste we generate.*

Subjects: *Science, environmental education, social studies, language arts*

Vocabulary: *Solid waste, natural, synthetic, natural resources, renewable resources, nonrenewable resources, degradable, biodegradable, photodegradable, recyclable, reusable, decomposition, compostable, sanitary landfill, transfer station, incinerator, waste-to-energy, hazardous waste, toxic, groundwater, leachate, dioxin, fly ash, bottom ash, recycling center*

Activities

Materials

INTRODUCTION TO "WASTE AWAY"

Objective: *To introduce the "Waste Away" program--its goals and format.*

Procedure: *Introduce the program to the students by describing the "game plan" for the weeks ahead, including how they will be teacher-facilitators for others in school, at home, in the community and at the Trash Festival. Explain that we will be exploring possible answers to these and other questions:*

-- *Is waste really a problem?*
-- *How does waste affect our daily lives (and vice versa)?*
-- *How did we get to this point (causes of waste)?*
-- *Is anything being done to limit waste now?*
-- *What can we do to improve the waste situation?*

WHOSE PROBLEM? (A Puppet Show) ♥♥

Objective: *To introduce the concept of waste, its magnitude and some problems associated with it.*

Procedure: *Present or have students present puppet show. Then briefly discuss the puppet show and answer questions the children might have.*

- *script, (p.12)*
- *puppet stencils, (p.15)*
- *puppet stage or table turned on its side*

MEET THE TRASH ♥♥

Objective: *To introduce vocabulary terms and evaluate types of trash.* ***Note:*** *Teacher must save class' trash from previous day (including paper, plastic, food, etc.)*

(activities continued on next page)

♥♥ - Activities for which volunteer assistance would be helpful.

MEET THE TRASH (cont.) ▼▼

Procedure: *Divide children into five groups. Give each group a "Trash Sorter" card with one pair of the following terms, plus their definitions written on the back (see glossary for definitions):*

- *natural or synthetic*
- *renewable resource or nonrenewable resource*
- *biodegradable or nonbiodegradable*
- *easily recycled or not easily recycled*
- *reusable or not reusable*

Allow time for the groups to read their "Trash Sorter" cards. Then give each group a bag filled with various clean trash items and ask them to sort their items into two piles according to the terms on their cards. When all students have finished, each group should define their terms (in their own words) and describe their trash item choices to the rest of the class. Write each set of terms on the board as they are introduced and discuss in detail. Display on newspaper the contents of the classroom trash. Using the dish gloves, sort through the trash and ask the children how some of the items relate to the above categories. Decide, as a group, what makes up most of the classroom trash. About what percentage is paper? How might the amount of paper thrown away be reduced? See "Reduce Paper Waste" (p.9).

- *class trash from previous day*
- *"Trash Sorter" cards*
- *5 bags filled with 6 trash items appropriate to categories*
- *1 pair of dish gloves*
- *newspaper*

NAME THAT TRASH ▼▼

Objective: *To have fun while reviewing concepts taught in previous activity.*

Procedure: *Hang a trash item sign (see list below) on the back of each child, without the child's seeing it. Pair children up or do in groups and have them take turns asking yes or no questions about their items until they guess what they are. Encourage the children to use the terms they just learned by asking questions such as, "Am I biodegradable?" After the game is over, address any confusion the children might have had about their items (e.g. Is a milk carton easily recycled?).*

List of trash items: *Paper plate, cotton T-shirt, cardboard, plastic cookie package, notebook paper, orange peel, plastic wrap, banana peel, plastic grocery bag, paper towel, aluminum can, plastic silverware, glass jar, paper napkin, apple core, disposable pen, newspaper, soup can, plastic soda bottle, milk carton, toothpaste tube, aluminum foil, steak bone, potato skins, old wool sock.*

- *index cards made into hanging signs with a waste item written on each*

WHERE DOES IT GO?

Objective: *To introduce various destinations of solid waste and some problems associated with its disposal.*

Procedure: *Using script as a guideline, show slides or magazine pictures to present information. (Your solid waste district may have slides to loan.)*

- *script, (p.21)*
- *slides or pictures*
- *projector*
- *carousel*
- *screen*

PANTOMIME THE PROBLEM ▼▼

Objective: *To point out the consequences of some throw-away habits on wildlife.*

- pantomime cards

Procedure: *Divide the children into small groups. With larger groups, children can act as props within the skits. Give each group a pantomime card. Allow the children a few minutes to plan and practice their pantomimes. Groups then should take turns presenting their skits while others guess the problem. Briefly discuss the connection to waste.*

PROBLEMS

1. *A couple of people take a walk, and one throws a soda bottle away in the woods. A mouse crawls in but can't get back out. It dies there.*
2. *Overnight campers try to burn their trash at their campsite. A hungry bear paws through the pile and seriously cuts its foot on the lid of a can.*
3. *A machine in a factory pumps waste into a nearby river. The fish in the river die from the pollution. An osprey flying over cannot find any fish for food.*
4. *Boaters throw their trash into the ocean. A turtle thinks a plastic bag is a jelly fish and eats it by mistake. The bag blocks the turtle's digestive tract, and the turtle dies of starvation.*
5. *A cook cleans the oven and then throws the rags and half empty bottle away outdoors. They land in a puddle. Some animals drink that water and get sick.*
6. *Someone tosses a lighted cigarette out of the car window. It lands in some dry leaves, and they burst into flames. A bird sitting on her nest nearby has to flee or get burned; moles, mice and chipmunks also run for their lives.*

DON'T THROW YOUR TRASH IN MY BACKYARD! (a song)

Objective: *To share a song about waste and end the day on a positive note.*

- Words for "Don't Throw Your Trash In My Backyard!" (p. 23)

Procedure: *Present the song. Then have the children sing it in rounds. End by saying that the first step to solving any problem is to become aware of and understand it and that we will be learning ways to solve the waste problem.*

WASTE--WHAT IS IT? SESSION I--Follow-up

Activities **Materials**

In Class:

CROSSWORD PUZZLE

Objective: *To review vocabulary and introduce other waste terms.*

Subjects: *Language arts, science, social studies, environmental education*

Procedure: *Give students the crossword puzzle as a homework assignment.*

- *crossword puzzle with list of words written on the back, (p. 24)*

WASTE PROBLEMS POSTERS

Objective: *To review the problems associated with waste.*

Subjects: *Art, environmental education, social studies, science*

Procedure: *Generate a list of problems caused by solid waste (e.g., water pollution, acid rain and health problems). Divide the children into small groups and assign a different problem to each group. In their groups, children are to design and make posters demonstrating their problem. The posters might be titled "Waste Means ...(fill in the rest of the title with the problem)." These posters can be displayed around school and at the Trash Festival (p. 84-86).*

- *poster board*
- *pencils*
- *markers*

REDUCE PAPER WASTE

Objective: To assess classroom paper waste and try to reduce it.

Subjects: Math, language arts, environmental education

Procedure: Set up two boxes for used paper next to the trash can. Label one "Reusable" and the other "Not Reusable." Discuss what would be considered reusable paper. Tell the children that all used classroom paper should be placed (not crumpled) in the appropriate box instead of thrown out. Do this for five days without reusing any paper from the box. Weigh and graph the amount of each type of paper. At this point, encourage the reuse of paper. The nonreusable paper can be recycled or used to make new paper. (See next activity, "Recipe for Recycled Paper.") Graphing could be continued once a week and discussed.

- 2 boxes

RECIPE FOR RECYCLED PAPER

Objective: To see how to make new paper from used paper.

Subjects: Art, science, environmental education

Procedure:

1. Tear or cut used paper into half-inch pieces and place in a bowl.
2. Soak in water over night or in hot water for half an hour.
3. Take a handful of soaked paper and place in a blender or bowl half full of water.
4. To strengthen paper, add two teaspoons of cornstarch.
5. Blend at a moderate speed until you no longer see any pieces of paper. You have made pulp.
6. Pour several batches of pulp into a large basin half full of warm water. Increasing or decreasing the amount of water will affect the thickness of your paper.
7. Stir.
8. Slide the screen into the bottom of the basin and move around until it is evenly covered with pulp.
9. Lift the screen out carefully.
10. Drain over an empty basin for at least a minute.
11. Put the screen with the pulp side up on a towel or blotter on top of some newspaper.
12. Put another towel or blotter over the pulp and more newspaper over that.
13. Roll the rolling pin over it to squeeze out as much water as possible.
14. Take off the top newspaper and turn the blotter-sandwich over so that the screen is on top.
15. Take off the blotter and screen very carefully. (Note: A butter knife might help.) Don't move the pulp.
16. Allow to dry for a day or two.
17. When the recycled paper is dry, neatly trim the edges.

A Clean-Up Note: Collect left over pulp in a strainer. Be careful not to pour pulp down a sink drain--it might block it. The strained pulp can be composted, thrown out or kept in a container in the freezer for the next time you want to make paper.

- 3 large basins
- used classroom paper (without staples)
- water
- cornstarch
- egg beater or blender
- wash basin
- towels or blotter paper
- newspaper
- rolling pin
- butter knife
- sponge
- strainer
- professionally-made recycled paper

(activities continued on next page)

RECIPE FOR RECYCLED PAPER (cont)

Discussion questions:

- *How are energy and natural resources conserved by making recycled paper instead of new paper?*
- *Are there drawbacks to recycling paper?*
- *Why would it be good to use less paper even if it is recycled?*
- *How can we use less paper?*
- *Examine some professionally-made recycled paper. Does it look any different?*

IT'S IN THE NEWS

Objective: *To heighten the children's awareness that solid waste issues are frequently addressed in the news.*

Subjects: *Social studies, language arts, environmental education, science*

Procedure: *Over a two-week period, schedule each child to check newspapers for two days for articles dealing with solid waste. Children may check magazine articles as well. Any articles found can be shared with the class, discussed, and put on a bulletin board.*

In The School:

TRASH THEATER

Objective: *To share information while reinforcing their own knowledge about the problem of solid waste.*

Subjects: *Language arts, science, social studies, environmental education*

Procedure: *Working in small groups, have the children take turns groups performing the puppet show in other classrooms or do this at a school-wide assembly.*

- *puppets, (p.15)*
- *script, (p.12)*
- *posters*
- *words to song, (p.23)*

Perform "Pantomime the Problem" (p.7) for other classes.

Sing the song "Don't Throw Your Trash In My Backyard!" (p.23) or write original songs about the solid waste problem and sing those.

ANALYSIS OF THE SCHOOL'S TRASH

Objective: *To investigate the trash generated in the school.*

Subjects: *Language arts, environmental education*

Procedure: *Go on a school tour (ask the school custodian if he/she would lead this) and investigate the following:*

(continued on next page)

ANALYSIS OF THE SCHOOL'S TRASH (cont.)

- *What area of the school produces the most trash?*
- *How much trash does the school produce each day?*
- *What area of the school produces the least trash?*
- *What is the most common kind of trash?*
- *How often is trash picked up?*
- *What is the cost of removal?*
- *Has that cost changed recently? Why?*

Record and display results of the investigation.

In The Community:

TRASH PROFESSIONALS

Objective: *To obtain firsthand information about some of the local disposal options.*

Subjects: *Language arts, social studies, environmental education*

Procedure: *Invite your local waste hauler to the class. With the class, develop a list of questions to ask your guest. Some sample questions are listed below.*

- *How many truckloads of trash do you collect each day?*
- *Where is the trash taken and what are the costs there?*
- *How many miles do you drive each day? Each year?*
- *Would you ever consider operating a curbside recycling service? Why or why not?*

At Home:

TRASH SORT

See Home Booklet. Share results with the class.

For The Festival:

Refer to "Planning For A Trash Festival" (p.84) and "Trash Festival Activity Ideas" (p.86). Start thinking about the scope of your Trash Festival. Set a date.

WHOSE PROBLEM?

(script for puppet show)

Characters: *Carol*
Mike--carrying a Coke can
Coke Can
Tree
Deer
Horse

Carol: *Hey, Mike, what d'ya think about this new waste project we're going to do in school? Waste of time, if you ask me!*

Mike: *Oh, I dunno -- guess it doesn't affect me much. I'll have to keep taking out the trash no matter what.*

Carol: *Well, it's going to affect me if I have to sit through a bunch of classes on garbage. I mean, who cares? Boring!*

Mike: *Who even says there is a problem? If there is one, it's not my problem! I gotta go throw this Coke can away. See ya around. (Mike leaves.)*

Carol: *I gotta go, too. (She walks along.) (Can pops up behind her.)*

Coke Can: *Wait a minute, young lady.*

Carol: *What? Who said that? (She turns around.) Was that you? Didn't Mike just toss you in the trash?*

CC: *Yes, and that's what I want to talk to you about. Do you know how long it will take me to fall apart once I get taken to the dump? -- Whoops, excuse me, to the landfill?*

Carol: *No.*

CC: *Five hundred years, maybe longer. And that's a real waste because I could become a new can if I was recycled. And that would save energy, too.*

Carol: *Save energy? Oh, give me a break!*

CC: *It's a fact! Recycling aluminum saves 95 percent of the energy it takes to make a brand new can. That's partly because aluminum is made from bauxite that comes from mines in Jamaica and other far away places. It takes a lot of energy to mine it, ship it and refine it.*

Carol: *Oh. I never think about that kind of stuff.*

CC: *Most people don't. And here's something else most people don't realize. Once those mines are used up, that's it--finished, gone--no more aluminum!*

Carol: *I'd hate it if there weren't any more soda cans. I guess Mike shouldn't have thrown you away. I'll make sure you get recycled. Into the recycling box you go. (Can disappears.) O.K., aluminum cans are special, but I don't care about other trash. (She walks along. Tree appears in front of her.)*

Tree: *You would care if you knew more! Take me, for instance.*

Carol: *You? Trees don't have anything to do with trash. Do they?*

Tree: *Certainly! Do you know that it takes an entire tree to make a stack of newspapers just three feet high.*

Carol: *Really?*

Tree: *Yes, so if everyone took their newspapers to a recycling center, think how many trees it would save. Thirty-six acres of trees are cut every week just to make the Sunday New York Times alone.*

Carol: *Wow! That's how big my grandfather's wood lot is. One of those every week?*

Tree: *That's right. Most other paper can be recycled also. Millions of trees are cut unnecessarily each day for paper. We trees hope that teacher of yours gets you excited about trash. Just like the cans, we are valuable resources and don't want to be wasted, even if you can grow new ones to replace us. Oh no! I'm about to be cut down! (Make the "VROOM" sound to represent a chainsaw. Tree falls over and disappears.)*

Carol: *Oh dear! I guess I should think about recycling paper and not waste it either. (Deer appears.)*

Ms. Deer: *"Oh deer" is right! I want you to know that recycling paper and saving trees affects more than just the trees.*

Carol: *It does? What do you mean, Ms. Deer?*

Ms. Deer: *Saving trees and woods means saving homes for wild animals, including me.*

Carol: *Hmm, I never thought of that!*

Ms. Deer: *Yes, and it also means that all those tons and tons and tons of thrown away paper don't fill up the landfill. You know, when the landfill is full, they have to close it and start another.*

Carol: *Well, that shouldn't be too hard.*

Ms. Deer: *Oh yes, it is. Do you want one in your backyard?*

Carol: *Of course not, NIMBY! That stands for "Not In My Backyard!" ya know. But what about way deep in the woods, where no one lives?*

WHOSE PROBLEM?
(script for puppet show--cont.)

Ms. Deer: Way deep in the woods where no people live, but where other animals live. That's our home, our habitat. Not only does trash take over our homes, but sometimes animals think a piece of trash is food. They may choke or get sick from it. (Horse appears.)

Mr. Horse: Ya know, Ms. Deer, even if we don't mistake trash for food we can still get sick from it.

Ms. Deer: What do you mean, Mr. Horse?

Mr. Horse: Well, landfills do more than take up space. The old landfills, especially, can poison the land and water around them.

Carol: No-o-o, I don't throw away poison!

Mr. Horse: You might not realize it, but lots of things, like old batteries and car oil for instance, have unhealthy chemicals in them.

Ms. Deer: And what about paint remover, shoe polish, oven cleaners and many of the household cleaning products? Do you know what's in that stuff?

Carol: No, I never read labels. I just use the stuff and throw away the can or bottle. Like yesterday when I gave our dog a flea bath.

Mr. Horse: That's what most people do. And then it rains, and we're in trouble.

Carol: Rain? Rain is good for animals. How else will you get water to drink?

Mr. Horse: You're right, we need rain. But when it filters down through the landfill, it washes a lot of the chemicals out of the trash, creating an unhealthy liquid called leachate. These chemicals are carried along, sometimes far away from the landfill and even into ground- water, which supplies your wells.

Ms. Deer: And people are not the only ones who might drink polluted water, my dear. Animals might too. And let me tell you, we can get mighty sick from it.

Carol: That really sounds awful!

Ms. Deer: And there are lots of other problems caused by your trash, too.

Carol: I guess our teacher is right. There really is a trash problem. I need to learn more about it and what's more, starting right now, I'm going to do something about our solid waste problem before it's too late for all of us.

Mr. Horse: That's the spirit. Maybe you can get those kids out there in the audience to help, too. Good luck!

Carol: Thanks, and goodbye. I've got to hurry home before today's newspapers get thrown out and tell Mike trash is his problem. It's everyone's problem.

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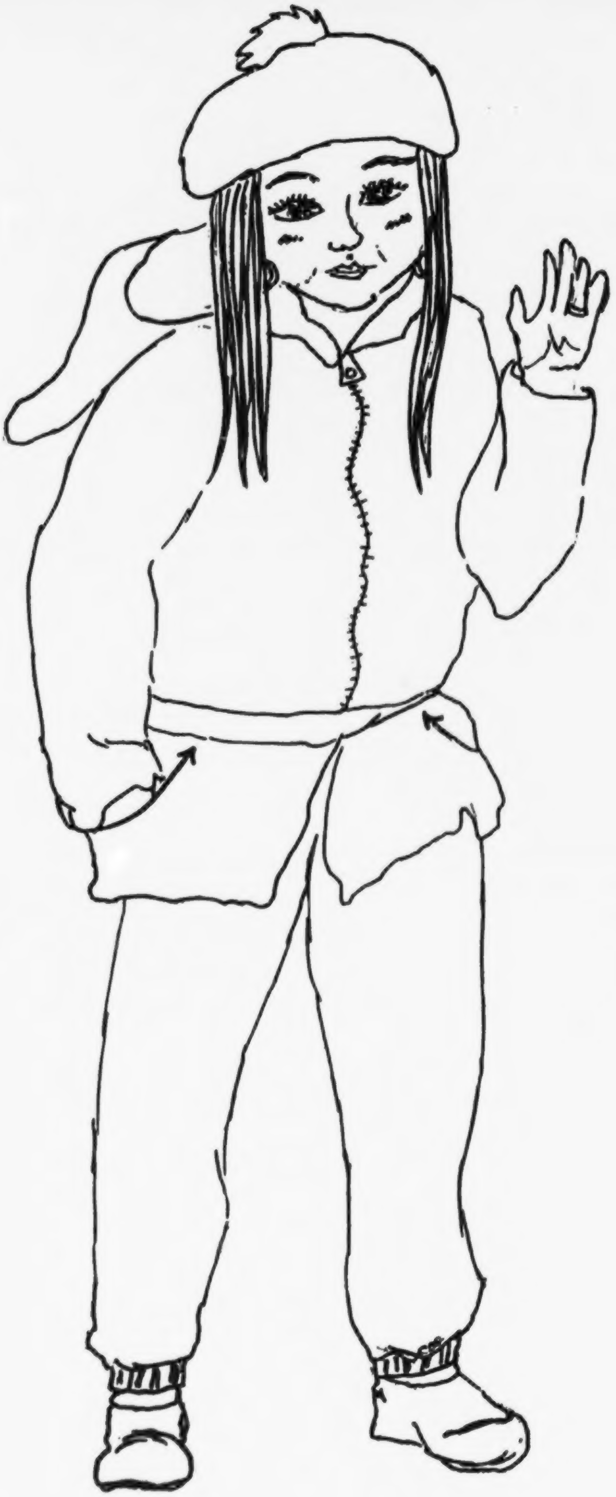
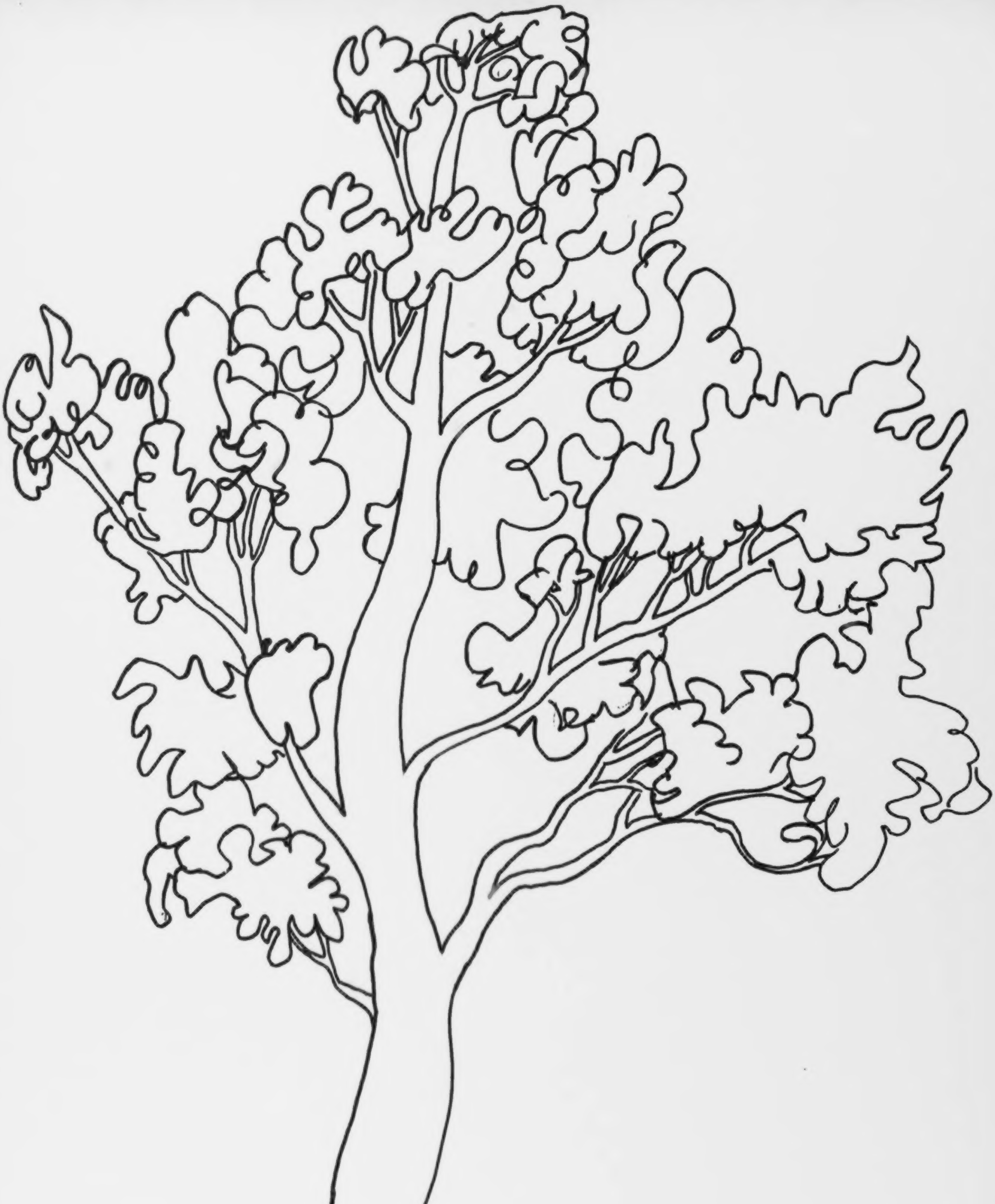


To make a puppet, color the picture, mount it on a piece of cardboard and glue it to a stick.

Coca-Cola
Trade Mark ®
CLASSIC



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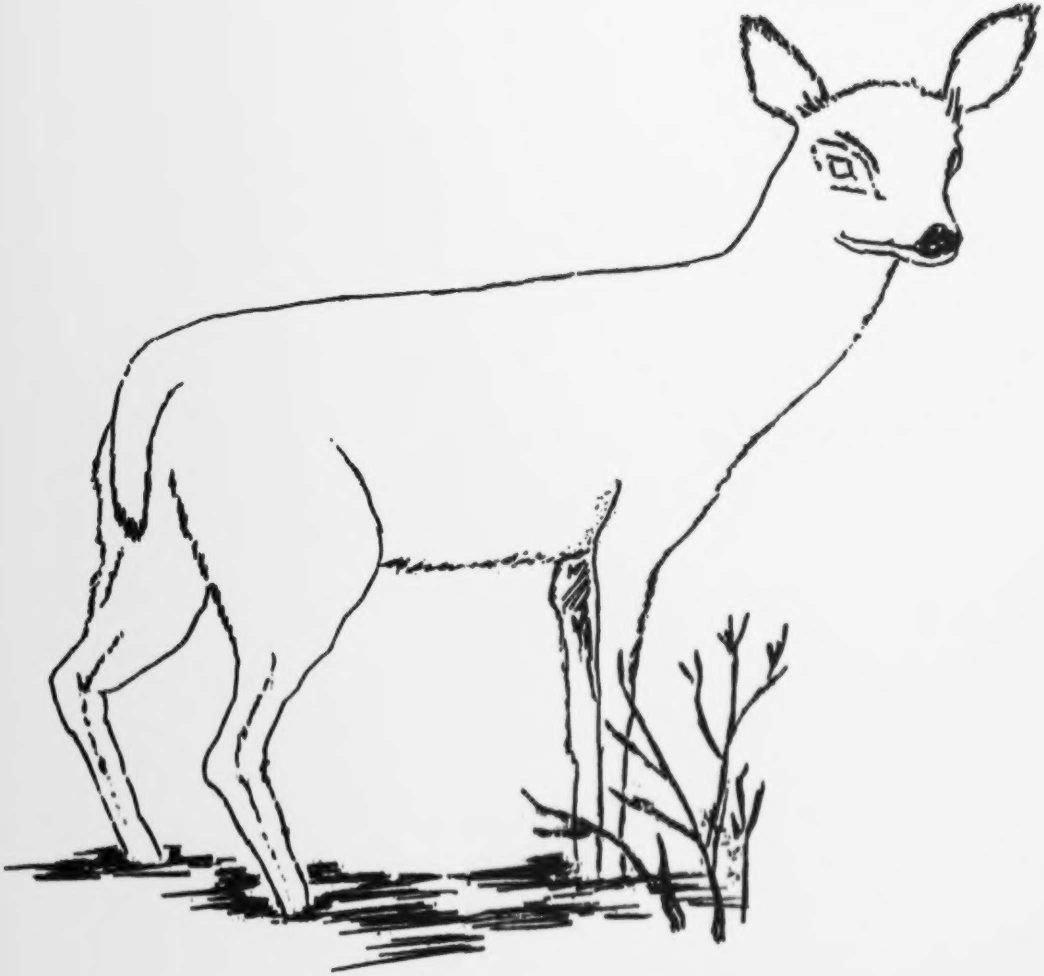

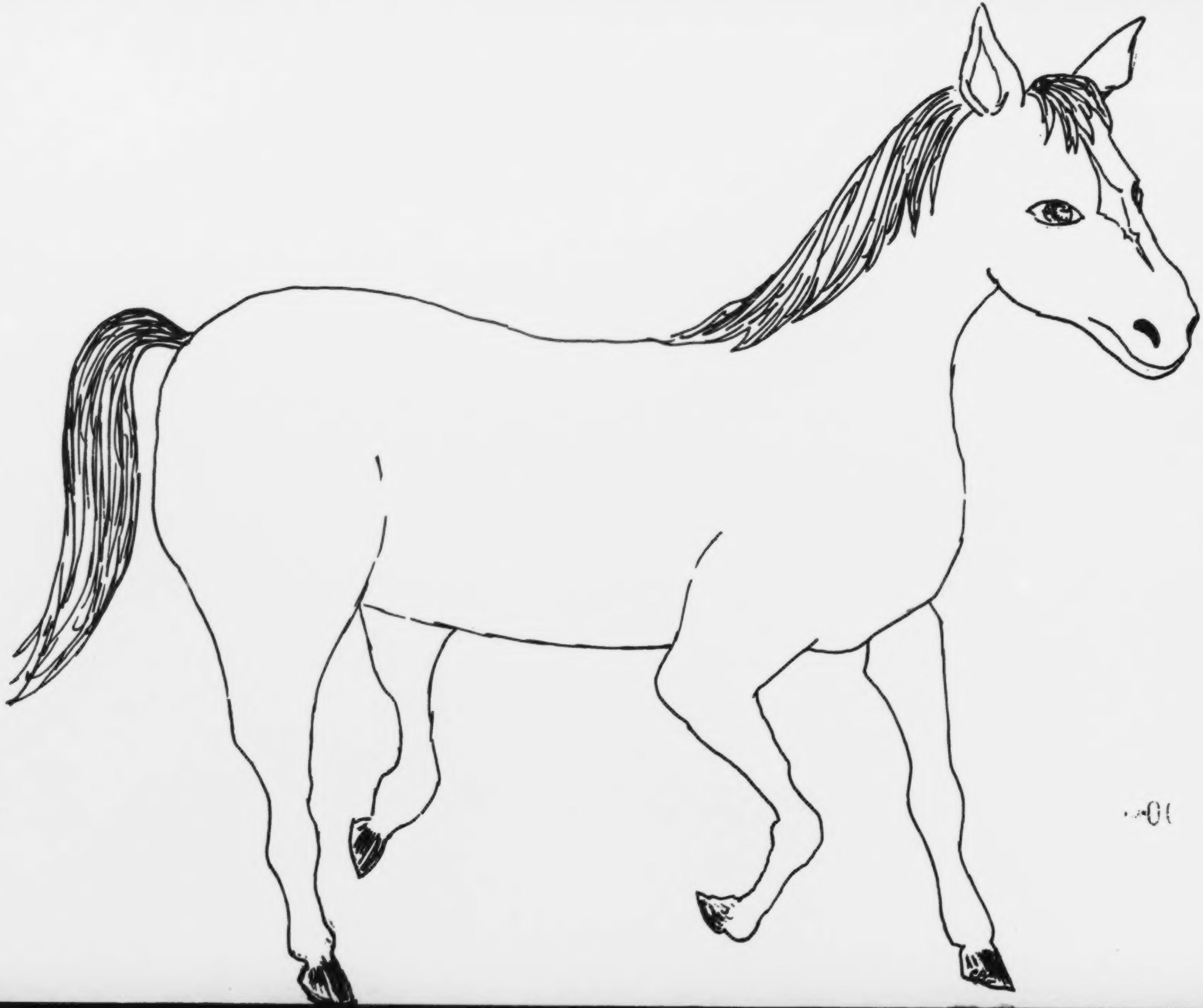

WHERE DOES IT GO?

(script for slide show)

1.	Big pile of trash	Approximately 3½ pounds of trash is thrown away by each person in the United States every day. On an average, each of us actually contributes almost 5½ pounds of trash daily when we account for trash from business, industry and government. That adds up to approximately 2,000 pounds, or one ton per person per year! That's a lot of trash!
2.	Landfill	What happens to all of that trash? Most of it ends up in landfills, which are special areas set aside by towns, cities, or regions for trash disposal.
3.	Trash-Hauling Truck	The trash is commonly taken to the landfill by large trucks that can compact the trash as they collect it.
4.	Bulldozer	Once they've dumped the waste, often in large piles, it is bulldozed flat and covered with earth to keep it from smelling bad or attracting animals.
5.	Diagram of Landfill	This diagram shows how landfills, called sanitary landfills, are designed. Sanitary landfills require a fenced-in area, a daily covering of dirt and other specifications.
6.	Liquid oozing out of trash	Only recently have people come to understand some of the problems caused by disposing of trash in landfills. One problem is leachate. When rain washes through landfills, it mixes with chemicals in the trash, forming leachate. Leachate contains poisons or toxins and can run off into nearby streams or leak through the ground into groundwater. Once groundwater is contaminated, it is very difficult or impossible to purify. Most of our drinking water comes from groundwater.
7.	People Spreading Lining	New lined landfills are lined with heavy layers of plastic and other barriers intended to collect the leachate and prevent it from seeping into groundwater. This type of landfill is very expensive, but necessary.
8.	Landfill	Even if we can design safe lined landfills, there is so much trash that we are running out of space to put it. The average landfill becomes full in about thirty years.
9.	Fire	An alternative way of disposing of trash is to burn it in incinerators. The heat from incinerator fires can be used to create steam which, in turn, produces electricity for heating buildings and running machinery. This type of incineration is called waste-to-energy.
10.	Diagram of Incinerator	This picture shows how trash can be burned in an incinerator. What's left at the bottom of the incinerator is called bottom ash. There is also ash that floats up in the hot air and is collected in pollution control devices. This ash is called fly ash.

WHERE DOES IT GO? (script for slide show--cont.)

11.	***Ash***	***Disposing of both types of ash, especially fly ash, is a problem, because they usually contain high concentrations of dangerous toxins such as heavy metals and dioxins. Among other harmful effects, these toxins can cause cancer.***
12.	***Transfer station***	***Some waste does not go directly to its final destination. It is stored temporarily in what is called a transfer station. This is because hauling waste a long distance is very expensive; it's cheaper to store it until a full load has piled up. When enough waste has accumulated, it is picked up and taken either to a landfill, or if properly sorted, perhaps to a....***
13.	***Recycling collection center***	***Recycling collection center.***
14.	***Curbside recycling collection containers***	***In some cities, people sort their waste, separating out the recyclables. This is called "source separation." When their trash is picked up at their curb, so are their recyclables. This is called "curbside recycling."***
15.	***Recycling Center***	***Some towns are recycling a large portion of their waste which means that much less trash needs to go to a landfill or an incinerator.***
16.	***Compost Bin***	***This compost collector at a recycling center is for household compost, such as food scraps and grass clippings. What other kinds of waste might be recycled?***
17.	***Newspapers***	***Newspapers***
18.	***Cardboard***	***Cardboard***
19.	***Glass***	***Glass***
20.	***Cans***	***Aluminum cans, and sometimes tin-coated steel cans as well***
21.	***Plastic Jugs***	***Recycling plastic is more complicated than other kinds of recycling, because there are so many kinds of plastic. Jugs like these can be recycled. Unlike glass or paper, which can be recycled into new glass or new paper, plastic jugs are not presently recycled into new plastic jugs. They might be made into plastic lumber used for building boat docks, park benches or fences. Plastic soda bottles might be made into materials for carpeting, pillows and polyester clothing.***
22.	***Trash***	***Recycling makes sense because it helps to reduce the amount of waste we need to incinerate or deposit in landfills. The production of items from unrecycled materials uses enormous amounts of natural resources and energy, so recycling saves resources and energy.***
23.	***Family Recycling***	***Everyone can help recycle and be part of the solid waste solution.***

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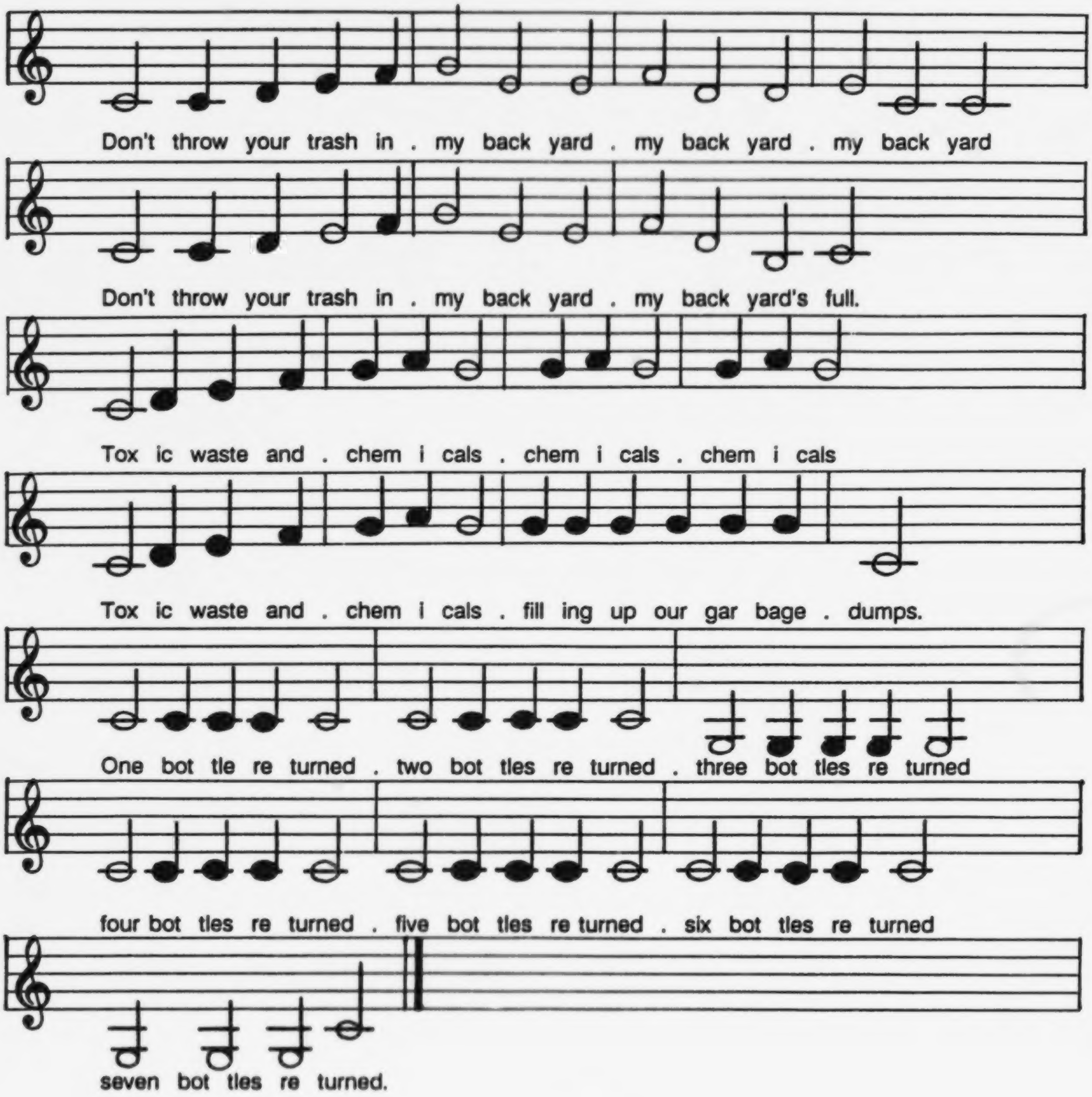
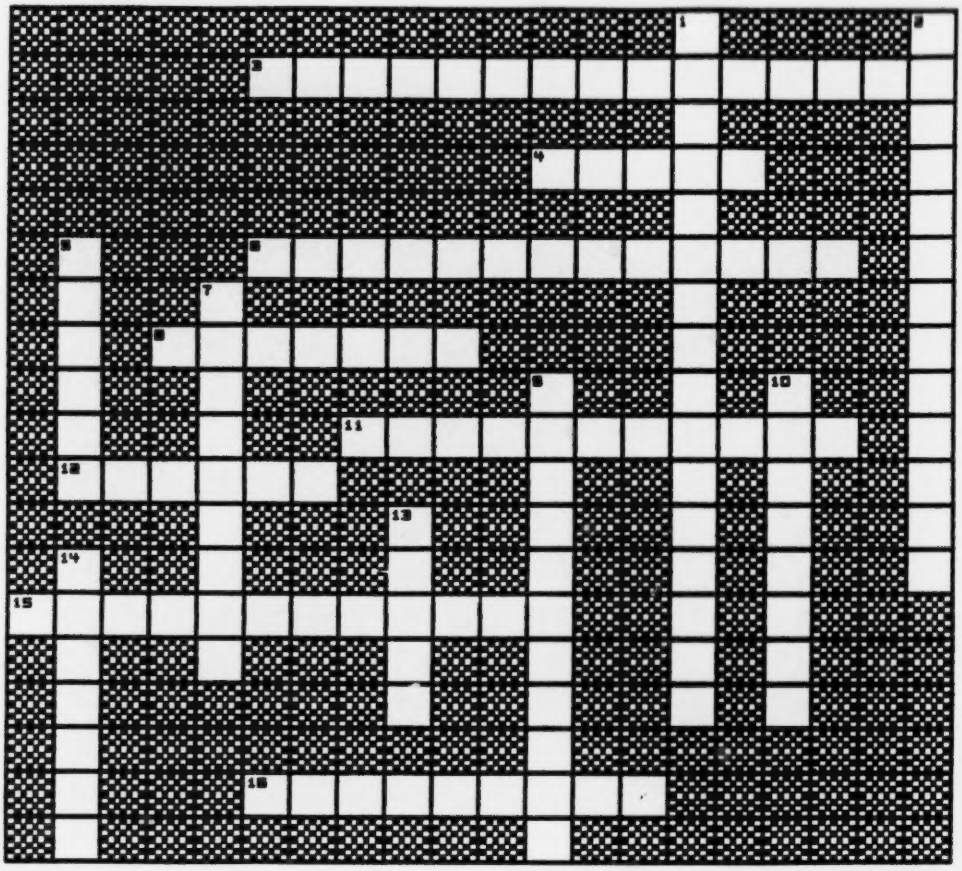
DON'T THROW YOUR TRASH IN MY BACKYARD !


Don't throw your trash in . my back yard . my back yard . my back yard
Don't throw your trash in . my back yard . my back yard's full.
Tox ic waste and . chem i cals . chem i cals . chem i cals
Tox ic waste and . chem i cals . fill ing up our gar bage . dumps.
One bot tle re turned . two bot tles re turned . three bot tles re turned
four bot tles re turned . five bot tles re turned . six bot tles re turned
seven bot tles re turned.

WASTE AWAY CROSSWORD PUZZLE



ACROSS

3. Capable of being broken down by ultraviolet light
4. Poisonous
6. Capable of being broken down into simple compounds by microorganisms
8. To collect and reprocess manufactured materials for reuse either in the same form or as part of a different product
11. Water found below the surface of the earth
12. To make less of something
15. Limited in amount, cannot be replenished
16. Dangerous, harmful

DOWN

1. A specially-engineered site for disposing of trash on land to protect public health
2. The breakdown of organic material by bacteria and fungus
5. Waste material discarded in an inappropriate place
7. Raw materials used to make products
9. An ______________ reduces waste volume by burning
10. A liquid containing bacteria and other poisonous materials which often drains out of landfills
13. Another word for solid waste
14. Decomposed organic waste which is used to fertilize soil

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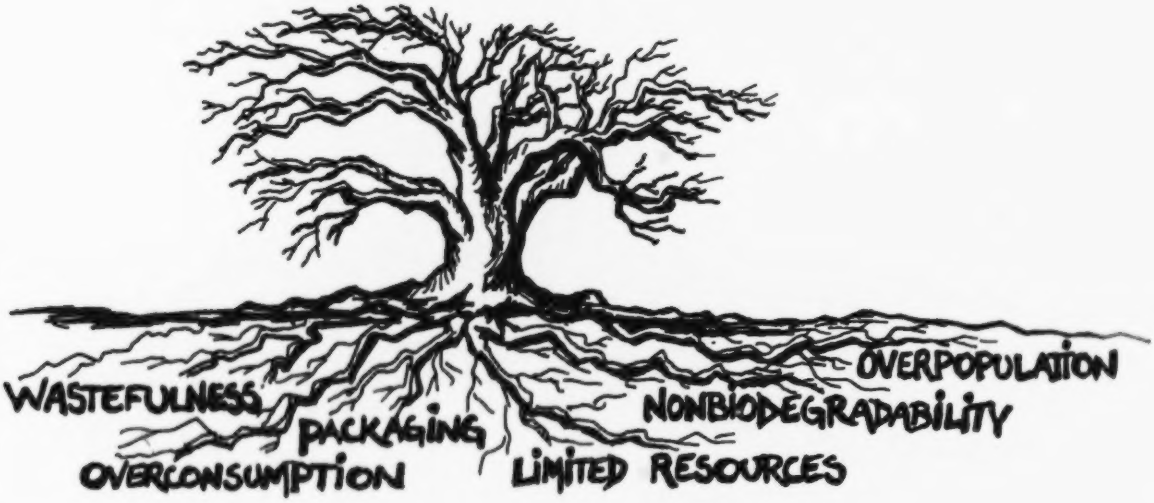
WORD LIST FOR CROSSWORD PUZZLE

BIODEGRADABLE
COMPOST
DECOMPOSITION
HAZARDOUS
GROUNDWATER
INCINERATOR
LEACHATE
LITTER
NONRENEWABLE
PHOTODEGRADABLE
REDUCE
RESOURCES
RECYCLE
SANITARYLANDFILL
TRASH
TOXIC



NATURE'S RECYCLING

Decomposition

Every living thing produces waste. Nature's wastes--old leaves, insect exoskeletons, nut shells and other such items--seem to disappear. But nature recycles its nutrients. Earthworms, millipedes, ants and other soil organisms obtain food by digesting dead plants and animals. Microorganisms (bacteria, fungi and other decomposers) continue the process by breaking down the complex structures of dead plants and animals into simple components, such as carbon, nitrogen, phosphorus and potassium, which enrich the soil. Absorbed by the roots of plants, these nutrients are essential to growth.

Composting

The natural decay process can be duplicated in backyard and municipal compost piles, where microorganisms may feed on organic materials and churn out a dark, rich, crumbly substance called humus. This humus is a natural fertilizer and also increases water retention in soil.

Composting can reduce municipal waste disposal costs. Each summer, the

collection and disposal of approximately 30 million tons of grass clippings alone cost United States taxpayers a total of $600 million, which does not include the cost of 4 billion nonbiodegradable plastic bags. At home, composting can be a simple process of turning kitchen food scraps and yard waste into rich soil for use with either indoor plants or an outdoor garden. (For directions to set up your own home composting system, see p.39.)

WASTE--A MODERN DAY PROBLEM

Waste was not always a great problem for people. The lives of early people were more directly connected to the earth. Some cultures cared for the health of their environment in a more thoughtful way than we often do today. Some Native American cultures regarded the earth as a living being, worthy of respect and thoughtful, thankful use. That attitude prevented needless exploitation and waste of resources.

Population

Human population growth has magnified many problems. Certainly the problem of solid waste has grown with each new person on the planet. More people make more waste--it's as simple as that. Overpopulation is not just India's or China's problem. The United States' population growth is slower than that of many developing countries, but it is faster than any other industrialized country.[1] Because of our lifestyle this population growth has a significant impact on the environment.

Lifestyle

As our technologies have changed and our standard of living has risen, we have become a more wasteful society. Although the United States represents only 5 percent of the world's population, we use 25 percent of the world's resources.[2] Consequently, we generate a disproportionate percentage of the world's waste. In addition, we consume more than 30 percent of the world's energy.[3] When we throw away two aluminum cans, we waste more energy than is used daily by 1 billion people in poorer countries.[4]

The lack of knowledge and/or apathy of many people toward waste is an important root of the solid waste problem today. One woman put it well when she said, "In an era when the adage 'waste not, want not' has given way to 'when in doubt, throw it out,' Vermonters are wallowing in their own trash."[5]

Industry and Technology

Industry and technology have enabled people to accomplish many noble tasks but have also contributed significantly to today's solid waste crisis. Before modern technology, the chore of harvesting the earth's natural resources, like minerals and petroleum, was extremely difficult. Today, with complex machinery, resources are taken relatively easily, fostering the misconception that it is an easy task to simply find and harvest more. There's little incentive for natural resource conservation with such an attitude.

Packaging

Packaging is important in keeping food sanitary and preventing spoilage. However, disposable packaging accounts for 40 to 50 percent of all consumer trash.[6] *Much of the product packaging we see these days is excessive. Nearly all modern packaging is thrown out immediately after the product is purchased, and an average 10 to 13 cents per dollar spent by the consumer goes toward packaging.*[7] *In addition to increasing the cost of products, packaging contributes to the problems of litter and solid waste. Also, large amounts of energy and natural resources are used in the manufacturing and disposal of the packaging. For example, in 1974, the Environmental Action Foundation found that the energy used to produce the packaging used in McDonald's restaurants in a year was equal to the amount of energy used by the cities of Boston, San Francisco, Washington, D.C. and Pittsburgh for a full year.*[8] *In the United States, the packaging industry uses: 50 percent of all the paper, 10 percent of all the glass, 29 percent of all the plastic and 14 percent of all the aluminum.*[9]

Plastics

The use of plastics for packaging has been growing fast. About half of the plastics in our trash now comes from packaging.[10] *Although only 7 percent by weight,* *plastics account for 25 to 32 percent of the volume of household trash.*[11] *(The volume of plastics is reduced once they are compacted in the landfill.) 20 billion pounds of plastic enter the United States' waste stream every year.*[12] *(See p.54 for information about recycling plastics.)*

Some people are particularly concerned about plastic packaging for several reasons. First, some animals mistake plastic for food and die of starvation when their digestive tracts become blocked. Others die after becoming snared in plastic items, such as six-pack rings and plastic bags.[13]

When we use and throw away plastic packaging, we are placing great demands on our supply of limited natural resources because plastics are made from coal and oil. Also, many of the chemicals used to make plastics are extremely toxic.

Plastic polystyrene foam, commonly known by its principal trade name "Styrofoam", presents another major environmental concern: the depletion of the earth's protective ozone layer. The ozone layer is a sheet of ozone (O_3) in the stratosphere, which shields out much of the sun's ultraviolet (UV) light. Large quantities of gases, called chlorofluorocarbons (CFCs), are used as blowing agents in the production of polystyrene. These CFCs get into the atmosphere and are broken up by sunlight, releasing highly reactive chlorine atoms. These chlorine atoms then destroy the bonds of ozone molecules. One chlorine atom can break up as many as one hundred thousand ozone molecules.[14] *In addition to causing ozone depletion, CFCs account for one-quarter of the greenhouse effect.*[15] *The greenhouse effect (the trapping of the earth's heat by accumulated atmospheric gases) causes global temperatures to rise with serious environmental consequences such as climate changes, oceans rising and desertification.*

Degradable Plastics

There are two kinds of degradable plastics currently available today. Both of these types of degradable plastics help get rid of visible litter but do nothing to eliminate the plastic molecules which are filling up our landfills. The so-called "biodegradable bags" have cornstarch added between the chains of plastic molecules (polymers). The small percentage of the bag which is cornstarch will decompose, leaving tiny bits of plastic, which are not biodegradable.

"Photodegradable" plastics have some of their chemical bonding made with compounds which disintegrate with prolonged exposure to sunlight. These plastics will deteriorate into smaller pieces only if they are exposed to ultraviolet light for a long enough period of time. They, too, do not actually decompose.

However, a truly biodegradable plastic has been developed. Called PHBV, it is completely biodegradable. It decomposes to only water and carbon dioxide. PHBV is produced not by petroleum, as are all other plastics, but by yeast-like micro-organisms that ferment sugar. Unfortunately, because the technology for producing PHBV is so new, the plastic costs $15.00 a pound, about 30 times more than the commonly used plastics now available to consumers.[16] Cellulose bags resemble plastic bags and are biodegradable because cellulose is derived entirely from plant fiber.

A growing concern is that the introduction of degradable plastics might presen an obstacle to recycling plastics. Another consideration is that little is yet known about how different plastics will disintegrate and how safe the substance they break down into will be, especially when combined with other chemicals in landfills.[17] Also, the availability of degradable plastics may eliminate people's desire to reduce their use of plastics altogether.

Disposable Diapers

One example of the many disposable products which contribute substantially to our waste stream is single-use (disposable) diapers. The diapers are usually made with an outer layer of waterproof polyethylene plastic. Sandwiched between the plastic and water- repellent liner is a thick layer of an absorbent cotton-like material made from wood pulp.[18] Such disposable diapers account for approximately 2 percent of municipal solid waste, and between 3.5 and 4.5 percent of household solid waste by weight.[19] But volume and weight of waste are not the only concerns regarding disposable diapers. Disposable diapers present a special problem because they contain raw sewage, which enters our landfills completely untreated.

Cloth diapers are reusable and, therefore, do not add to the waste stream or use up as much of our natural resources. New cotton diapers are often equipped with velcro, so pins are no longer needed. Diaper services that use cloth diapers present an alternative to families who do not wish to spend time laundering cloth diapers.

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ROOTS OF OUR WASTE PROBLEM SESSION II

Focus: There is a direct relationship between lifestyles and the generation of solid waste.

Subjects: Science, social studies, history, geography, environmental education, language arts

Vocabulary: Plastic, styrofoam, ozone, consumer

Activities | Materials

ASKAMI'S STORY

Objective: To examine the history of waste in North America and introduce some of the underlying causes of our solid waste problem.

Procedure: Before this session, make an audiotape of Askami's Story (See script, p.42). You may want to ask someone unknown to the children to read the script. Display the medicine circle and play the tape. After completing the story ask the students to explain the message of Askami's Story in their own words and discuss the laws of nature. Explain that the following activities will further demonstrate each law.

- medicine circle, (p.44)
- tape recording of script
- tape player

A PACKAGED PICNIC ♥♥

Objective: To become aware of adequate versus excessive food packaging.

- 2 oranges
- wrapping material

Procedure: Show students two oranges, one attractively wrapped in clear plastic in a box and with a ribbon, the other without wrapping. Ask them: Which orange is wrapped? Which one would they buy? Point out the natural packaging of the unwrapped orange. Discuss excessive packaging.

Now divide the class into groups of four to five students. On a table in front of them, display a wide variety of food packages and utensils, including examples of both adequate and excessive packaging. Ask half of the groups to plan a picnic, choosing adequate food packages and eating utensils. Ask the remaining groups to plan an excessively packaged picnic. (The groups should list, on paper, the items they choose, rather than actually removing them from the table.) Allow time for each group to describe their picnic to the rest of the class. Discuss packaging alternatives. What becomes of packaging? Relate this activity to the law: "There is no waste in nature".

- variety of food packages and eating utensils
- paper
- pencils

♥♥ - Activities for which volunteer assistance would be helpful.

WHERE IS "AWAY"? ♥♥

Objectives: To demonstrate that there is no such place as "away." To introduce existing pathways for our waste.

Procedure: Keep the same groups from "A Packaged Picnic". Have each group choose one item of trash left over from their picnic. Encourage the children to use their imaginations and make up a story which describes the path that item might take after it has been thrown away. Passing the item along, each child adds a sentence to the story, (e.g., a milk carton goes into the trash barrel, it is loaded into a truck, it falls out of the truck, etc.). Notes should be kept on the pathways so that the group can present their story to the rest of the class.

As an entire class, discuss where each group's trash ended up. Did their trash item cause any problems along the way? Relate this activity to the law: "There is no such place as away".

IT'S GOT TO COME FROM SOMEWHERE ♥♥

Objectives: To develop an awareness of the natural origins of a variety of modern products. To distinguish between renewable and nonrenewable natural resources.

Procedure: Set up a "machine" by draping a sheet over four chairs, clipping it securely and leaving a space to crawl through between the chairs. Inside the machine, place four boxes, labelled "Animal," "Petroleum," "Rock/Mineral," and "Plant." Place appropriate household object word cards (see list below) in each box. There should be at least as many cards as there are students.

Have the students form a line, facing the machine's entrance. Give each a natural resource card. Explain that each child will enter the machine as a secret natural resource of some type--animal, petroleum, rock/mineral, or plant--depending on the natural resource card each is given. As they go through the machine, they should choose a household object card from the labeled box which corresponds to their natural resource card. They will then exit as a manufactured product.

Once out of the machine, the student should hold up his/her manufactured product for the rest of the class to see. The group should guess the natural resource origin of the object held up.

When all the students have taken their turns, ask them to group by natural resource. Give each group a pencil and a "Where From" question sheet to fill out. Have each group share their answers with the rest of the class. Relate this activity to the law: "The Earth has limits".

- 4 chairs
- large bed sheet and clips
- household object word cards
- small natural resource cards (7 each): "Animal" "Petroleum" "Rock/Mineral" "Plant" (1 set for each student)
- 4 large labelled boxes (1 per category)
- "Where From?" sheets, (p.45)
- pencils

(continued on next page)

IT'S GOT TO COME FROM SOMEWHERE (cont)

Household object words:

Animal	Plant	Rock/Mineral	Petroleum
milk	newspaper	silver fork	acrylic sweater
leather shoe	paper napkin	soup can	plastic fork
natural sponge	paperback book	iron frying pan	motor oil
sheepskin mittens	wooden chair	aluminum lawn chair	toothbrush
leather belt	cotton T-shirt	table salt	polyester duffle bag
beef steak	potato chips	glass	plastic trash can
wool sweater	straw broom	ceramic plate	shower curtain

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BREAD AND KISSES

Objective: *To experience the unequal distribution of resources around the world.*

Procedure: *Divide the class into two groups: One representing the U.S. and the other representing the rest of the world. The U.S. group will be made up of approximately 5 percent of the classroom population (if 20 students are in the class, one will represent the U.S.).*

- *1 small loaf of unsliced bread*
- *chocolate kisses (enough for each child)*

Divide the bread into fifths and the chocolate kisses into fourths. Explain that the bread represents the world's food supply, and that the kisses (wrapped in aluminum foil) represents the world's resource supply. The U.S. group is given 1/4 of the kisses and 1/5 of the loaf of bread. The rest of the class (representing the rest of the world) gets what remains. Toss the remaining bread and kisses into the center of this group, allowing them to divide these as they see fit. Allow for chaos.

Lead a discussion, focusing on the following:

-- *What were some of the feelings among the "rest of the world" group and among the "U.S." group as they divided their portions among themselves?*
-- *Was the distribution fair?*
-- *What would happen if we brought in another 25 people to share the bread and kisses?*
-- *How does overpopulation of the"rest of the world" and the "U.S." affect the distribution of resources? How does this relate to the real world? (See background information p.27)*
-- *What can be done to even the inequity?*

Relate this activity to the law: "Everything is connected".

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CHANGING LIFESTYLES

Objective: *To promote an awareness of the relationship between lifestyles and the generation of waste.*

- *2 boxes*
- *2 bags*
- *miscellaneous unbreakable items*
- *large open area*

Procedure: *Divide the class into two teams (lines). Place two large boxes labelled "Great Great Grandma's House" and "My House" at far side of room. In front of each line of students, place a bag of miscellaneous household items, representative of both modern (throw- away) and circa 1900 (durable) lifestyles. (Note: In your item selection, gather a larger number of modern items, to illustrate the fact that people now have more possessions than they did in the past. A sample bag might contain a handknit cap, container of motor oil, styrofoam cup, canning jar, wooden spoon, plastic bowl, etc.) At signal, students run a relay race, with each team member choosing an object from the bag and depositing it in the box where the object would more likely be found ("Great Great Grandma's House" or "My House"). After the race, discuss:*

-- *Which box has more items in it? Why?*
-- *How many items in each box are reusable?*
-- *How many items in each box are biodegradable?*
-- *How many items in each box are recyclable?*
-- *Which items might cause environmental problems? (ozone depletion, toxins, air and water pollution, etc. Provide additional explanations when necessary.)*
-- *What are some good substitutes for the items which are usually used only once?*
-- *The fact that many people today include choices from Great Great Grandma's lifestyle in their lifestyles. Give examples.*

Relate this activity to all four laws.

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ROOTS OF OUR WASTE PROBLEM SESSION II--Follow-up

Activities **Materials**

In Class:

THE LORAX

Objective: *To further examine some of the roots of our waste problem.*

Subjects: *Language arts, social studies, environmental education*

Procedure: *Read The Lorax to your students. Carry on a class discussion using The Lorax worksheet or have the children write out their own answers to the questions on the worksheet and later hold a class discussion.*

- *The Lorax by Dr. Seuss*
- *The Lorax worksheet, (p.46)*

DESIGNS FOR WASTE

Objective: *To examine packaging alternatives.*

Subjects: *Art, environmental education*

Procedure: *Show students several examples of excessively or poorly packaged products. Give one product to each small group of students and ask them to design an alternative package, choosing the best materials available from one of the two different supply tables (one of which has ecologically sound materials, i.e., recyclable, biodegradable, made from renewable resources). Remind the students that their packages should protect their item from damage, look appealing and be ecologically sound. Share the finished packages. Summarize some of the problems with packaging, including cost of materials, perishability and transportation expenses.*

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- *examples of poorly packaged products*
- *paper*
- *markers*
- *cardboard*
- *tape*
- *glue*
- *cellulose bags*
- *aluminum foil*
- *plastic wrap*
- *paper with colored, glossy finish (difficult to recycle)*

LETTERS ABOUT PACKAGING

Objective: To give the children an opportunity to share their opinions and perhaps affect the packaging of products.

Subjects: Language arts, social studies, math, geography, environmental education, science

Procedure: Have each child bring in one example of a product which is overpackaged and one example of a product which is not overpackaged. Have them write letters to the product manufacturers expressing responses to the packaging, suggesting improvements and explaining how overpackaging contributes to the solid waste problem. A large map could be displayed to mark locations where products and packages were produced.

- packaged items from home

TRASH AUTOBIOGRAPHIES

Objective: To encourage the children to think about the resources and energy needed to create the products we use and some of the problems associated with their disposal.

Subjects: Language arts, environmental education, science, social studies

Procedure: Have each child choose one object from a home trash can. Each child will become that object and write an autobiography. She/he should address such questions as:

-- What natural resource did I come from?
-- How was I made?
-- What sources of energy were used in my production and transportation?
-- What was my packaging?
-- How was I consumed?
-- How did I end up in the trash can?
-- What do I think will happen to me now?
-- Am I biodegradable?
-- Can I be reused or recycled?
-- Did I need to be purchased in the first place?

- trash items from home

COMPOSTING

Objective: To understand how easily organic matter can be recycled.

Subjects: Science, environmental education

Procedure: Discuss how nature recycles plant and animal matter. Explain that composting takes advantage of this process not only to make nutrient-rich humus, but also to reduce solid waste.

- organic waste
- large container
- bricks
- pan
- sawdust, soil or leaves
- broom handle

(continued on next page)

Here's How You Do It

You can compost indoors in a container, a 20 to 30 gallon garbage can works well. (If you compost outside, simply make a large pile which should be between 3' x 3' and 6' x 6'.)

1. *Punch holes in the bottom of the container and place it on bricks. Place a metal pan under the bricks to catch the drippings. (These drippings are nutrient-rich and can be poured on garden plants.)*

2. *Gather dry materials such as hay, sawdust, soil or leaves to absorb moisture.*

3. *Alternate layers of one inch of dry material with several inches of food scraps. Smaller pieces compost more quickly. (Avoid meats and cheeses. These attract animals.)*

4. *If the pile gets dry, water it periodically--enough to make it moist, but not soggy.*

5. *(If outside, cover the pile with a thick layer of leaves to insulate it.)*

6. *Make sure there is oxygen in the pile since decomposers must also breathe. Gently turn the pile once a week with a broom handle. Building the pile on a bed of branches or cornstalks also helps aeration.*

7. *Measure the temperature. The inside of the compost heap should eventually get to be 140 - 160° F as the decomposers give off heat energy. This heat helps kill disease organisms and weed seeds.*

8. *Let the compost sit for three to four months before spreading it on a garden. At this time it will have become a rich humus.*

Discussion Questions:

- *What are other benefits of composting?*
- *What would happen to the waste if you did not compost it?*
- *How would you set up a method to compost at home?*
- *Are there problems with placing large amounts of organic waste material in landfills? What are they?*

In The School:

WASTE PROSE

Objective: *To have the children share what they have learned, while reinforcing their knowledge.*

Subjects: *Language arts, social studies, environmental education*

Procedure: *Have the children take turns reading The Lorax, "Askami's Story" or their trash autobiographies to different classes. They could carry this a step further by creating plays of the stories and presenting them at an assembly.*

LUNCH WASTE GRAPH

- *paper*
- *ruler*
- *marker*

Objective: *To make the school community aware of the school's lunch waste and to reduce some of the waste.*

Subjects: *Math, language arts, environmental education*

Procedure:

For schools with a cafeteria: Assign a small group of students to measure by volume the total school lunch waste for two days. If it is separated, the measurements can be done by category (e.g., food scraps, utensils, paper). The measurements can be based on inches filled in garbage cans. Graph the amount of waste for those two days. Display the graph with an explanation for the rest of the school. Discuss ways that they might reduce waste. Continue graphing periodically for a couple of weeks. (Graph can be continued later along with specific waste-reduction activities.)

For schools without a cafeteria: Classroom lunch waste can be measured and graphed. Students can encourage other classrooms to participate. Graphs from various classrooms can then be compared and a prize awarded to the class which reduces their trash the most without throwing it out elsewhere.

PACKAGING DISPLAYS

- *packaging letters and products*

Objective: *To share information about overpackaging.*

Subjects: *Language arts, social studies, environmental education*

Procedure: *Display copies of letters about packaging (p.38) and the packages themselves in the halls for others to see.*

In The Community:

SENIOR CITIZEN INTERVIEWS

Objective: To find out what people did with their trash two generations ago. To inform community people about the Waste Away Project.

Procedure: Have the children interview someone they know who is 50 years old or older and ask questions about waste of the past, such as:

- *What things used to be regularly reused which are thrown away now?*
- *How did trash look then as compared to now?*
- *Where did your trash go?*

Have the children share information about the Waste Away project and invite the interviewee to the Festival.

At Home:

STORE SCAVENGER HUNT

See Home Booklet.

FAST FOOD THROW-AWAYS

See Home Booklet.

For The Festival:

Save "Waste Prose" (p.40).
Save "Packaging Displays" (p.40).
Put on a play of The Lorax.

INVITE LOCAL BUSINESSES

Objective: To have local businesses participate in the Festival.

Subjects: Language arts, social studies, environmental education

Procedure: Call or send letters to invite local businesses to attend the Trash Festival. Some businesses might be encouraged to set up displays about how they are limiting their solid waste.

Local recycling groups, trash haulers, etc., can also be invited.

ASKAMI'S STORY

Greetings. I am Askami, which means "always" to the Abenaki Indians, the original native people of Vermont. My message has always and will always be truth. You may wonder why I have been sent to speak to you. It is to share a vision of the past, the present and perhaps the future. Today you have a waste problem, but this was not always so. There was a time when there was no waste problem on Mother Earth. There was a time, my sisters and my brothers, when all the creatures of the world knew and followed Mother Earth's four Laws of Nature and so lived in harmony. I will now teach you these four laws.

With my story, I will be taking you to a time before European settlers traveled to the shores of the American continent--a time long, long ago when the world was younger and there were no people. Listen very carefully and try to forget the world as you know it, for much was different in those early days. Close your eyes for a moment and imagine the scene I will describe to you.

The land before you has no buildings. It is covered with giant ferns and plants you have never seen. The rivers, lakes and oceans are clean. Animals roam the land freely. They form a delicate web of life with one animal serving as food for another. When an animal dies, its flesh and bones are consumed by other hungry animals. What is not eaten is returned to the soil, making it richer and healthier for plants to grow. And so, we have our first Law of Nature: "THERE IS NO WASTE IN NATURE."

Time moves on and my ancestors, the Native Americans, travel to these lands. They follow the first Law of Nature and take from Mother Earth only what they need. When they kill a buffalo, they eat its flesh, hold a big feast and share the meat with the entire tribe. They wear the skins and make the bones into tools. They waste nothing. Even the teeth are used as jewelry. My people always give thanks to the animals when they take their lives, for they know the animals are our brothers and sisters.

My people give thanks to all the animals and plants, the rivers and air, and even the sun. They realize they need all of these things to survive. And so, we have the second Law of Nature: "EVERYTHING IS CONNECTED." If we harm our friends the insects, we harm the birds that eat the insects. If we poison our water, we poison ourselves.

It is now the year 1607, and the fair-skinned people come from the east across the big sea and live here with my people. Soon we see towns scattered over the countryside. Farmlands replace forests. The settlers work hard to clear the land. Many people prosper, and with this prosperity, some people forget the first two Laws of Nature. They kill more animals than they need to survive, and many animals are killed just for the fur.

Time goes on. The land becomes filled with many people who use more than they need and create much waste. But the people do not know the third Law of Nature: "THERE IS NO SUCH PLACE AS AWAY." All things must go somewhere. And so, the people's waste comes back to them, for they must drink the water and use the land they have polluted to grow their food.

ASKAMI'S STORY (cont.)

Time goes on. Many, many people now live on the earth. More people have more possessions. To create more things, they take more from the land, metal to build machines which make products, oil to make the machines work. More...more...more. But Mother Earth has only so many gifts to share with her children. The fourth law, my sisters and brothers, is: "THE EARTH HAS LIMITS." There is only so much oil, metal and land. There is a limit to how much waste we can create, for we are running out of places to put our waste.

And so you see, my mission is urgent. Although I see the past and understand the present, I cannot truly predict the future, because you, the children of the earth, are the creators of the future. It is up to you to decide what the future will be. Let the Laws of Nature guide you in your thoughts and actions.

I leave you with words spoken in 1854 by a wise Native American brother, Chief Seattle:

> *"WHATEVER BEFALLS THE EARTH*
> *BEFALLS THE CHILDREN OF THE EARTH.*
> *MAN DID NOT WEAVE THE WEB OF LIFE.*
> *HE IS MERELY A STRAND IN IT.*
> *WHATEVER HE DOES TO THE WEB,*
> *HE DOES TO HIMSELF."*

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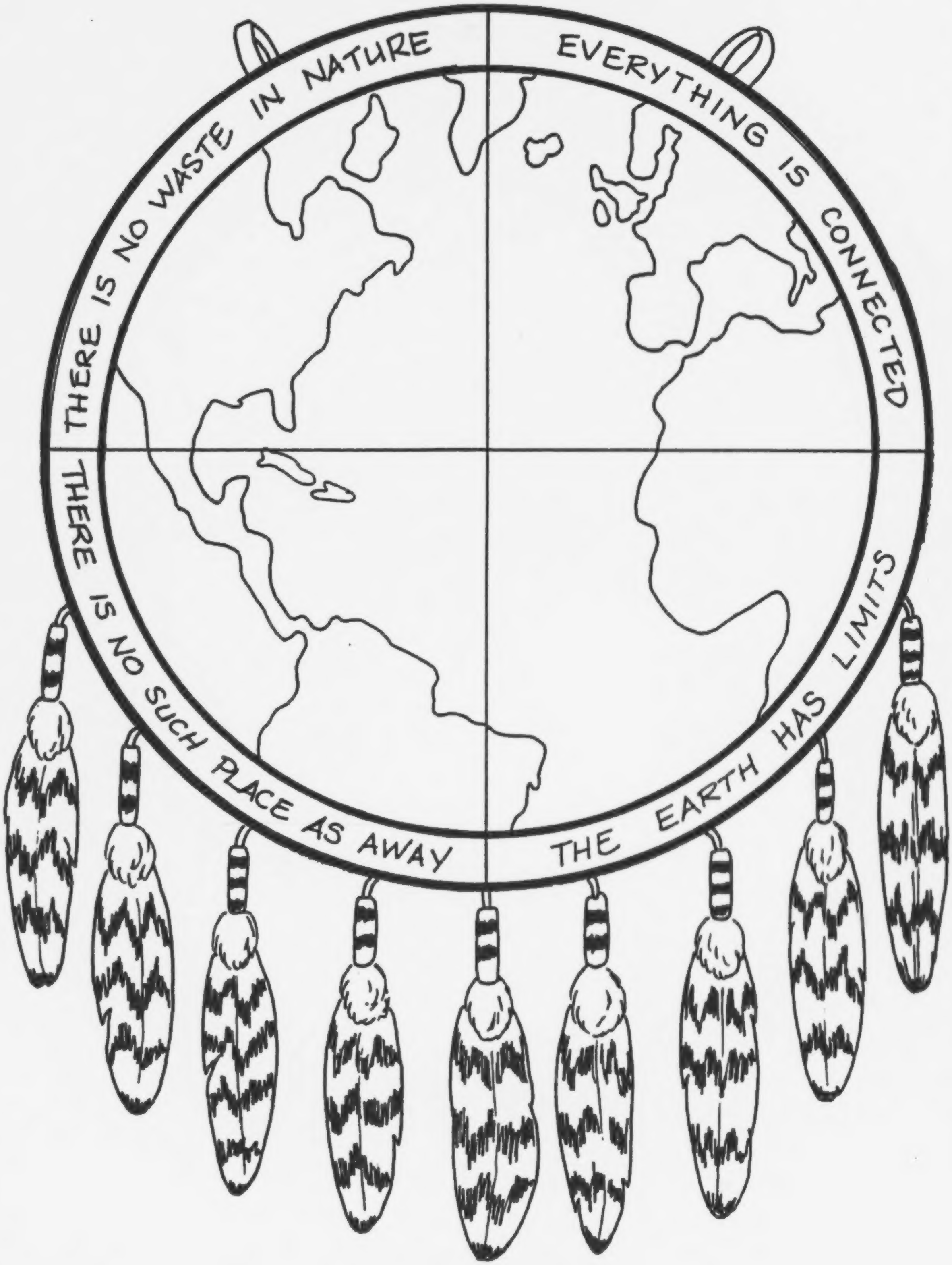
MEDICINE CIRCLE with LAWS OF NATURE


THERE IS NO WASTE IN NATURE
EVERYTHING IS CONNECTED
THERE IS NO SUCH PLACE AS AWAY
THE EARTH HAS LIMITS

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WHERE FROM? -- Worksheet

1. *Which of your objects come from the earth?*

2. *Which of your objects are usually used just once and then thrown away?*

3. *Which of your objects are biodegradable?*

4. *Which of your objects are not biodegradable?*

5. *Is your group's natural resource "renewable" (able to be "grown" again within a fairly short period of time)?*

6. *Is your group's natural resource "nonrenewable"?*

7. *What can we do to avoid using up all of your natural resource?*

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T H E   L O R A X -- Worksheet

1. *Why did the Once-ler cut down the Truffula trees?*

2. *Who, in real life, do you think the Once-ler represents?*

3. *Who, in real life, do you think the Lorax represents?*

4. *What is a thneed? Give an example of a thneed in your life. Why do people buy thneeds?*

5. *What are some of the natural resources that the Once-ler family uses to manufacture thneeds?*

6. *What are gluppity glup and schloppity schlop? Do we have these?*

7. *The super-axe-hacker is an example of technology. Is technology always good? Why or why not? Is technology always bad? Why or why not?*

8. *What could the Once-ler have done to minimize his factory's impact on the environment?*

9. *The Lorax said he, "speaks for the trees, for the trees have no tongues." If the Truffula trees could speak, what do you think they'd say?*

10. *What does the Lorax's message "UNLESS" mean to you?*

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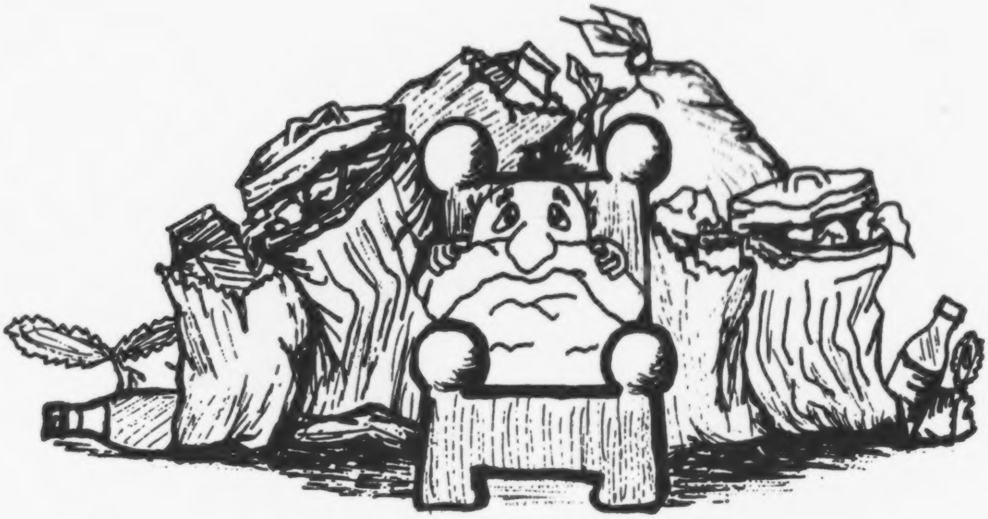


WHAT'S THE PROBLEM?

If you look closely enough, you can find waste just about everywhere--in your home, your school, your community. From glass in the trash can to styrofoam cups at meetings, waste surrounds us. We may feel outnumbered, even powerless, in our communities' and schools' waste-related decisions (although, in truth, we are often far from that), but in our homes we are free to make our own choices. We can choose to break old habits by buying minimally packaged products with origins in renewable or recyclable natural resources. We can choose to extend the lives of the items and packaging materials we purchase by reusing them again and again. We can choose foods and beverages in recyclable containers. In our homes there are many choices we can make to reduce the waste we create.

Household Hazardous Waste

Ironically, many of the products we use to tidy our houses, clothes and cars contain chemicals which are dangerous to the health of our families and the *environment. According to the University of Vermont's Extension Service, the average American household has three to ten gallons of unwanted hazardous chemicals in the garage, basement, shed and kitchen. When dumped into landfills (as they often are), these chemicals can leach into our soil and water supplies, escape into the air, and endanger the health of various forms of life nearby. The following are examples of products which contribute to household hazardous waste: turpentine, paint, antifreeze, drain cleaners, swimming pool chemicals, wood stains, preservatives, varnishes, chemical fertilizers and weed and insect control chemicals. Recently, many towns have initiated household hazardous waste clean-up days, when residents may bring items to a central collection station. The waste products are then disposed of using the most safe and ecologically sound method available. However, some people question the ultimate safety of even these methods. The safest way to deal with household hazardous wastes is to reduce our consumption of them. The U.S. Environmental Protection Agency is considering banning the use of certain toxins for which there are substitutes available.[1] Changes in legislation and industry often come only after great public expense and effort, whereas changes in household purchasing patterns may be quick, easy and economical. (For more information about household hazardous wastes and their safer alternatives, please see the Home Booklet.)*

WHAT ARE WE DOING ABOUT IT?

Landfills

Each week, in homes throughout the country, a ritual takes place--"taking out the garbage." The garbage is placed in neatly tied trash bags or cans, deposited at the roadside and promptly forgotten about by those who generate it. But, the questions of where that trash should go and how it should be disposed of are becoming ever more complicated.

Until recent years, trash was simply piled into dumps. Today, landfills, in which solid waste is buried, are most common. In fact, 90 percent of our nation's waste is buried in landfills.[2] Before 1980, there were no federal regulations governing the *construction and management of landfills and little control over what went into them. Sanitary landfills, which replaced the old landfills, required a fenced area and a daily covering with dirt, in addition to complying with other specifications.*[3] *Old landfills and even sanitary landfills are likely to leak bacterial and chemical contaminants (in the form of liquid "leachate") into surface and groundwater. If groundwater becomes contaminated it is nearly impossible to control and can contaminate an entire aquifer.*

Some states are requiring that all new landfills and even existing ones have special liners and leachate collection systems. Lined landfills are very costly to construct. Some people claim that even liners and leachate collection systems are not a permanent solution to the leachate problem, since tests have shown that plastic liners develop leaks when exposed to chemicals including solvents and acids.[4]

Landfills present other problems. The rate of decomposition is extremely variable and can be very slow due to compaction and limited oxygen supply. Research excavations in a landfill exposed green grass clippings, a T-bone steak and five hot dogs, all very identifiable after more than 20 years. A newspaper from the same time period was still very readable.[5]

Methane is produced during anaerobic decomposition, which occurs when little or no oxygen is present. This gas burns very quickly and, if uncontrolled, can be dangerous. Methane also contributes to the greenhouse effect.[6] *In some landfills, methane gas is being tapped and sold as fuel.*[7]

Existing landfills are rapidly filling. The average landfill has a useful life of only 30 years.[8] *By the year 2000, half of all the United States' landfills are scheduled to close.*[9] *Faced with diminishing landfill space, some communities send their wastes to distant sites, some to other states. New landfill sites are becoming increasingly hard to find. The reasons range from social ("Not in my backyard!") to technical (the difficulty in finding sites with the right combination of physical characteristics, such as size and soil type).*

Incinerators

Some people view incineration as a possible solution to our nation's solid waste *dilemma. Burning trash reduces its volume and, therefore, consumes less valuable landfill space. Also, the steam produced during incineration can be used to heat buildings, run machinery and generate electricity. If incinerators generate energy, they are called waste-to-energy plants. Proponents of incineration charge that certain pollutants can be destroyed if burned at high enough temperatures.*[10]

Critics claim that incineration is not a sensible solution to the solid waste problem for a number of reasons. Without elaborate and expensive emission controls, incinerators release dangerous pollutants such as toxic heavy metals, acid gases, carbon monoxide and dioxins.[11] *Dioxins are produced by burning substances containing chlorine. (Plastics, table salt and bleached paper, are a few sources of chlorine compounds.) Some types of dioxins are among the most highly toxic substances identified and are capable of weakening the human immune system and adversely affecting fetal development.*[12]

With efficient pollution controls in place, most of the residual toxins accumulate in the fly ash (ash which floats in furnace heat and is collected at the top of the stack). When tested by the EPA, the State of New York and the incinerator operators, incinerator fly ash has been shown to exceed federal standards for hazardous waste more than 90 percent of the time. Mixed fly ash and bottom ash (ash which falls to the bottom of the incinerator) exceeds standards 50 percent of the time.[13] *If ash is dumped with solid waste into municipal landfills, its toxic effects can actually be exacerbated, rather than being diluted, because the combination of chemicals in a landfill hastens the leaching of metals.*[14] *In some locations, special ash landfills are being developed.*

Incinerators are very expensive to construct and difficult to site, due to public opposition. Finally, in order to operate efficiently, incinerators require a "flow control" ordinance or a continuous supply of trash and, therefore, do not provide an incentive for limiting waste generation or recycling.

The decision about whether to put our solid waste in incinerators or in sanitary landfills can be complicated. Different types of waste may be better suited for one or the other destination. Some people claim that tires, as well as some types of hazardous *wastes, have less environmental impact if incinerated. Paradoxically, it is easier sometimes to safely burn smaller quantities of hazardous wastes than to incinerate larger quantities of mixed municipal wastes. This is because the hazardous wastes are more uniform, their composition is better known and a high burning temperature can be maintained.*[15] *Many people feel that incineration should be considered only as a component of an integrated solid waste management strategy, which includes sanitary landfills but focuses mainly on source reduction and recycling.*

RECYCLING--ITS USE NOW AND ITS POSSIBILITIES FOR THE FUTURE

Recycling is a loop which involves collecting materials (such as glass, paper and metal), processing those materials and manufacturing them into new products. The benefits of recycling are fourfold, because it:

1. *reduces the amount of solid waste requiring disposal;*
2. *saves natural resources, including nonrenewable resources like petroleum;*
3. *reduces the amount of energy needed to manufacture new products; and*
4. *reduces pollution and destruction caused while obtaining new raw materials.*

The following chart lists some of the benefits from substituting secondary resources for virgin resources:

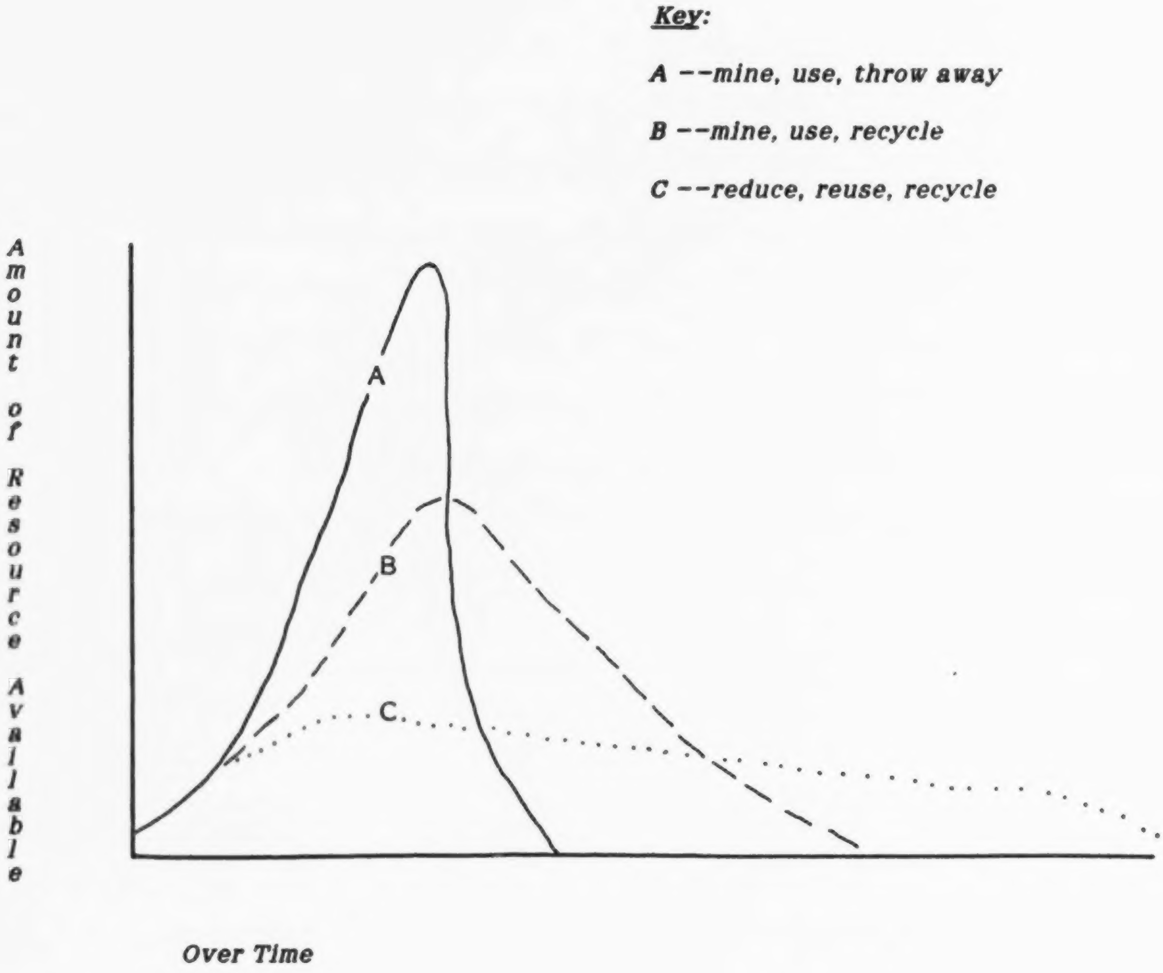
BENEFITS FROM SUBSTITUTING SECONDARY RESOURCES FOR VIRGIN RESOURCES
(PERCENT REDUCTION)

	Paper	*Glass*	*Steel*	*Alum.*
Energy	*23-74*	*4-32*	*47-74*	*90-97*
Air Pollution	*74*	*20*	*85*	*95*
Water Pollution	*35*	*--*	*76*	*97*
Mining Wastes	*--*	*80*	*97*	*--*
Water Use	*58*	*50*	*40*	*--*

Source: Letcher and Shiel, "Source Separation and Citizen Recycling", 1986[16]

Recycling may also expand employment opportunities. According to a study by the Canadian Waste Management Board, for every 1,000 tons of garbage landfilled, six jobs are sustained, but for every 1,000 tons of materials recycled, 36 jobs are created.

Additionally, recycling, combined with improved resource-use technologies and reduced resource consumption, can significantly extend the availability of our natural resources. The following graph illustrates three possible depletion patterns for a nonrenewable natural resource. Pattern A shows that a rapidly expanding use of a resource will lead to exhaustion of available quantities of that resource. Patterns B and C illustrate that this rapid rate of depletion can be significantly slowed by recycling, reducing consumption and reusing.



[Adapted from: Miller, G. Tyler, Jr., Living in the Environment. Concepts, Problems and Alternatives. Wadsworth Pub., Belmont, CA, 1975 and revised edition 1982.]

Currently, the United States recycles less than 10 percent of its municipal solid waste.[17] However, with improved technology, public cooperation and eager markets, the majority of our nation's municipal solid waste is recyclable.[18]

Recycling Paper

Even though they can be recycled, newspapers represent the largest single homogeneous commodity in landfills, by both weight and volume. Only 25 - 30 percent of the paper produced in the United States is currently recycled.[19] Total paper and paperboard content in excavated landfills was estimated to be 41 percent by weight.[20] Although almost half of our nation's solid waste is paper, and the average North American consumes about 600 pounds of paper each year (doubled since 1965)[21], most paper is needlessly sent to landfills.

A number of steps are involved in the process of recycling paper. First, sorted and baled paper is sent to a paper mill. At the mill, the paper is mixed with warm water to form a slurry. Contaminants (like staples) are then removed, and the mixture is bleached and de-inked. Finally, the slurry is spread on large screens, rolled, and formed into finished sheets of recycled paper. Recycled paper is used for newsprint, cellulose insulation, mulch, new paper, animal bedding and other valuable products.

Recycling Glass

Every year, the average North American uses 400 glass jars or bottles.[22] Some of these glass containers are reused; others are recycled; and others are sent to landfills, where the value of the glass is permanently lost. Recycling glass saves both resources and energy; one recycled bottle saves enough energy to power a 100 watt light bulb for four hours.[23]

The first task in recycling glass is to separate, by color, the clean glass. The glass is then broken into tiny pieces, called cullet, cleansed of any plastic and metal contaminants, and shipped to a processing plant. There the cullet is mixed with raw materials, melted and molded into new jars and bottles.

Recycling Aluminum

Certainly, aluminum is the easiest metal to recycle (though some mixed and other metal items are also recyclable). Making an aluminum can from recycled metal uses 90–97% less energy than manufacturing that can from raw bauxite. In other words, throwing out an aluminum soda can wastes an amount of energy equal to that can half-filled with gasoline (i.e., six ounces). American consumers and industries throw away enough aluminum to rebuild our entire commercial airfleet every three months.[24]

Aluminum smelters perform the first steps in the aluminum recycling process: they analyze, shred and decontaminate the metal. The aluminum is then melted (with impurities removed periodically) and poured into forms. The resulting aluminum ingots are sent to manufacturing plants, remelted and formed into new products.

Recycling other metal cans

Typically, soup cans, tuna cans and the like are made from steel which has been covered with a very thin coating of tin. Some recycling collection centers will accept these tin (steel) cans. They must be separated from aluminum cans. (A magnet will attract these cans but not aluminum.) To complicate the issue more, some food cans are bimetal. These cans are steel with an aluminum top and/or bottom. Bimetal cans cannot be easily recycled.[25]

Recycling Plastics

Traditionally, plastics (manufactured from nonrenewable petroleum resources) have been considered nonrecyclable. However, current technologies have made it possible to recycle some types of plastic. For example, recycled polyethylene terephthalate (PET) soft drink containers (the most widely recycled plastic type) may be made into materials for carpeting, pillows, furniture cushions and polyester clothing. Plastic milk jugs and detergent bottles, made from high density polyethylene (HDPE), may be recycled into corrugated pipe and durable, rot-resistant plastic lumber for boat docks and picnic tables.

At this time, plastics are not recycled back into food containers. This is not "same use" recycling and, therefore, does not reduce the quantity of plastic being produced to make plastic food containers. Also, many plastic products are difficult to recycle because they are made from more than one type of plastic. For example, squeeze bottles are made from five to seven types of plastics laminated together.[26]

The process of recycling plastic is similar to glass recycling. The plastics are first sorted by resin type. At the remanufacturing plant, the plastics are ground up, melted and reformed into new products.

Recycling Oil

Because motor oil is toxic, it is important not to pour it down sink drains or mix it with trash. One gallon of oil will spoil 250,000 gallons of water.[27] Instead, it can be recycled. One gallon of used motor oil can be rerefined into 2½ quarts of lubricating oil, while it takes 42 gallons of crude oil to produce the same amount.[28] The United States could reduce petroleum imports by 25.5 million barrels of oil each year and save 1.3 million barrels of oil each day by rerefining its used motor oil.[29] However, national industry figures estimate that only 3 percent of the used oil generated by people who change their motor oil in this country is currently being recycled.[30] In some states used oil can be returned to gas stations. Many towns and cities have set up oil collection drums and pay haulers to transport the used oil to a reprocessing facility for recycling.

Recycling Batteries

An estimated 83,500 tons of batteries are discarded annually, an average of 1.7 pounds per American household.[31] Batteries contain heavy metals such as mercury, lithium and cadmium, which are associated with public health hazards and, therefore, are causes of concern in incinerator ash and emissions and in landfill leachate.[32] Car batteries may be recharged or recycled. Certain types of household batteries can be recharged; others can be recycled in the U.S.; still others can be recycled abroad.[33] Currently, the most easily recycled batteries are the button cell batteries used in hearing aids and cameras.[34] Batteries that cannot be recharged or recycled should be saved for household hazardous waste collection.

Recycling Tires

Two hundred million automobile tires are discarded every year in the United States.[35] Tires cause disposal problems because they are not easily compacted and will float to the surface of a landfill unless they are shredded.[36] Tires can be burned in incinerators and have a high BTU value.[37] They can also be recycled into door mats, shopping cart wheels, truck bed liners, shoe soles and other products.[38] The rubber from old tires can be mixed with asphalt and used to pave parking lots, highways and driveways.[39]

Bottle Bills

Many states now have a container or "bottle bill". This type of legislation not only encourages recycling, but also has other advantages. In Vermont, the number of cans and bottles found along highways was reduced by an estimated 90 percent.[40] A study conducted by the Beer Wholesalers Association indicates that within two years of its implementation, the New York deposit law had saved 50 million to 100 million dollars in energy, while increasing net employment by at least 3,800 jobs. An unforeseen advantage of this type of legislation is the increase in recycling of corrugated cardboard used to package the containers.[41] Other states report similar positive results. Maine has cut its litter collection by 60 percent, and Michigan's economy has gained a net total of 4,600 jobs.[42]

Recycling: Some other thoughts

As our recycling interest, knowledge and technologies grow, so too will the list of recyclable materials. It is important for consumers to create a demand for products and packaging that are made from recycled materials. This will help expand the market for recycled materials in manufacturing and production.

While recycling makes sense, we cannot recycle everything, nor is recycling entirely pollution free. Additionally, recycling uses some resources and energy. Source reduction, on the other hand, has little or no impact on the environment and should, therefore, be emphasized in any solid waste management plan. See page 71 for ideas on how to reduce and reuse.

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WASTE AROUND US

SESSION III

Focus: *We produce waste in all areas of our lives; therefore, we control how much is produced and can affect how much exists.*

Subjects: *Environmental education, math, language arts, social studies, science*

Vocabulary: *Litter, reduce, reuse, recycle, transport*

Activities

Materials

THE WASTE PUZZLE ♥♥

Objective: *To review the four Laws of Nature (Session II: "Askami's Story," p.33) and illustrate how adherence to them can affect waste disposal.*

Procedure: *Hand out the puzzle pieces. Explain that each child is needed to solve the waste puzzle. Put out four pieces of cardboard and explain that parts of the puzzle can be fit together on the cardboard to form 4 sections of the complete puzzle. (Each piece should be labeled on the back with a number indicating the section to which it belongs. After a little while, if necessary, mention the numbers on the backs of the puzzles. Eventually all the "1's" will fit on one piece of cardboard, all the "2's" on the next, and so on. The four pieces of cardboard will then come together to solve the Waste Puzzle.*

Discuss:

-- *the four Laws of Nature and ask the children to give examples for each.*
-- *which items are within the circle and why.*
-- *how the items on the outside could be changed or the use of them changed to put them inside the circle.*
-- *whether other equally useful objects could be substituted for those items outside the circle.*

- *Waste Puzzle with enough pieces for each child, (model p.67)*
- *4 pieces of cardboard*

TRASH PATROL ♥♥

Objective: *To examine where trash is around the school and help clean it up.*

Procedure: *Explain that waste is all around us and that we would like to find out where it is around the school. Break the children into groups of three or four and give each group a bag. Lead students outside and head each group in a separate direction.*

- *large paper bags*
- *whistle*
- *newspaper*
- *1 pair of dish gloves*

(Continued on next page)

♥♥ - Activities for which volunteer assistance would be helpful.

TRASH PATROL(cont) ♥♥

Instruct them to pick up anything they see that is litter. When they hear the whistle, they must return as quickly as possible (as a group) to you. Review the terms...biodegradable, recyclable, synthetic. Place newspaper on a table and dump the litter on top. Use dishgloves to protect your hands and examine the litter noticing the different types. Where was the litter found? Discuss why people litter.

MILLION YEAR-OLD PICNIC

Objective: *To demonstrate that many materials are nonbiodegradable and will persist in the environment for many, many years.*

- *bag of items mentioned in "Waste Time Line" (p.64)*
- *decomposition rates (from "Waste Time Line" (p.64)*

Procedure: *Tell the participants they are going to go on a Million Year-Old Picnic. One by one, pull out items from your bag and have the children guess how long they think each container will take to decay. Be sure they know what the material is. After all of the items are spread out, challenge them to arrange the items in an order that indicates how long they would take to decay.*

When complete, rearrange the items correctly and lead a discussion on biodegradability versus degradability. Explain that while the plastic items may not be visible over time, they do not truly biodegrade (see background information p.29). Also consider the effect of landfills on biodegradability (see background information p.49).

Rearrange in order of best to worst for the environment considering as many factors as possible.

[Adapted with permission from: Miller, L.H. The Nature Specialist. Martinsville, IN: American Camping Association, Inc., 1986, 170 pp ($29.95).]

HOW MUCH IS IT?

Objective: *To visually demonstrate how much trash each person is responsible for producing every day and what the cumulative effects are.*

- *large bag of assorted trash*
- *1 large box*
- *scale*

Procedure: *Weigh empty box first and adjust the scale so that the weight of the box is not measured. Have children estimate how much of the box would be filled to create 3.5 pounds of trash. Have children take turns adding to the box until the scale reads 3.5 pounds. Explain that this is how much trash the average American throws out at home in one day. Fill the box until the scale reads 5.5 pounds. Explain that this is approximately the amount of trash created per person in this country each day if restaurant, industry, government and business trash were taken into account. Estimate how tall a stack of boxes the whole class would produce each day. Then estimate for the whole school, town, and country. Discuss predictions for the future.*

WHAT NEXT? ♥♥

Objective: To show that recycling saves natural resources and landfill space.

Procedure: Hold up (one at a time) a bottle, a tire and a disposable diaper. Ask the children what happens to each when it is no longer used. Talk about possible recycling alternatives for each item. (See background information p.30, p.53 and p.55.)

Divide children into three groups, with the number of students in each group corresponding to the number of steps in each pathway. Give a sign representing one step to each student. Get the children to come up with an order for the signs that explains the pathway their item follows to its final destination and arrange themselves accordingly. Have each group describe their pathway as they pass the item from start to finish.

- 6 bottles
- 6 bicycle tires (symbolic of car tires)
- 6 disposable diapers
- signs with neckloops for each step of each pathway (each group can be color coded to prevent getting them mixed up)
- 3 watches (for timing)

Bottle:

1. used
2. transport
3. recycling collection center
4. transport
5. recycling facility
6. melt
7. remake
8. transport
9. distributor
10. transport
11. new bottle in store

Tire:

1. used
2. transport
3. recycling collection center
4. transport
5. recycling facility
6. grind
7. transport
8. pavement making plant
9. mix with asphalt
10. transport
11. pavement

Diaper:

1. used
2. transport
3. landfill

Explain that the children will now use these pathways for a game that will illustrate which item saves the most natural resources and landfill space and which wastes the most.

Ask the "Bottle" group what happens after the last step, i.e., "What happens to the new bottle?" It becomes a used bottle and travels the pathway over and over again. That group should thus become a circle. Does the tire become another tire? Does the diaper become another diaper?

If there are extra children, designate one to be the Rhythm Setter who will set the rhythm by slowly keeping a beat; other children could be timers, one for each group. If there are too many children, pair some of them up.

Tell the children that when you say "Go," the "Used" person should pick up one of their six resource items and, in rhythm with the Rhythm Setter, pass the item to the next person. Continuing in

(Continued on next page)

WHAT NEXT? (cont.) ▼▼

rhythm, the item gets passed down the line to the end with only one item in motion at a time. When the item reaches the end of the line, the "Used" person picks up another item. (The "Bottle" group, in a circle, will not need to pick up another item.) When any group has depleted its resources, those children should sit down. The timer should note the time. When the "Tire" group is finished, allow the "Bottle" group to continue for a few more turns. Then call "Stop."

Have each group discuss its pathway in terms of:

--landfill space used.
--natural resources used and the length of useful life.
--the new product that is formed.
--alternative options for the used items (tires into retreads or burned for energy).
--changes in the item itself that might make it reusable or recyclable (cloth diapers).
--other uses for the same resources.

Mention that while recycling saves the most resources and energy, some energy is used and pollution created (melting, transportation, etc.). Reusing items and reducing our consumption, however, has the least impact on the environment.

CLARA CLUTTER

Objective: To have children begin to think about how they can help reduce, reuse and recycle.

Procedure: Clara Clutter comes clattering into the classroom moaning and complaining about how burdened she is by trash. Then she asks the children how they might reduce, reuse or recycle her clutter, removing appropriate items from her costume as the specific solutions are mentioned. Clara next presents and explains the graph of "Alternative Depletion Patterns for a Natural Resource". Clara tells the children to think of the information that they just learned as she hands out the "Waste Away Contracts". The children are now to think of something they can and will do to reduce the waste problem, write it on their contract, sign the contract and explain and present it to Clara and the rest of the class. She then thanks them for helping reduce her trash and for promising not to clutter her so much in the future.

Note: Classroom teacher should keep contracts for follow-up work and to use during Session IV.

- costume with pieces of trash attached with velcro
- blank "Waste Away Contracts" (p.68)
- pencils
- graph (p.52)

In Class:

RECYCLING IN YOUR TOWN

Objective: *To obtain, information about community recycling firsthand.*

Subjects: *Social studies, environmental education, language arts*

Procedure: *Meet with someone from your community solid waste or recycling committee or from a recycling business and find out what they are doing. Invite them to run a booth at the Trash Festival. Gather information about any community recycling facilities. Find out how you can help. Have students design and suggest solutions for the town. Questions to ask might include:*

- *What percentage of the community do you think recycles?*
- *How can we help?*
- *What items does your center collect?*
- *Where do the items go?*
- *How many people work at the center and what do they do?*

HOUSEHOLD HAZARDOUS WASTE

Objective: *To identify common household products which are potentially hazardous.*

Subjects: *Environmental education, science, social studies*

(continued on next page)

HOUSEHOLD HAZARDOUS WASTE (cont)

Procedure: *Bring in examples of a few common household products which are hazardous (see "Household Hazardous Waste" worksheet for ideas). For each product, ask the students whether they expect they might find that, or a similar product, in their home. Do they think there might be any hazard in these products? Read any cautionary advice on the labels. Review the concepts of leachate and fly ash and discuss how household hazardous waste can enter the air and ground and surface water.*

Many common household products are hazardous. These should be treated with care and attention. On the "Household Hazardous Waste" worksheet, have the students circle the picture of any product they think they will find in their home. Remind them that the Home Booklet contains information about household hazardous waste and some nonhazardous alternative products.

- *examples of hazardous household products*
- *"Household Hazardous Waste" worksheets, (p.60)*

CONTRACT REVIEW

Objective: *To encourage children to think about their personal contracts.*

Subject: *Language arts, environmental education*

Procedure: *Hand out the students' contracts. Have them write a short essay on how they plan to go about meeting their contracts. When they are finished, ask for volunteers to share essays. Note: Collect the contracts for Session IV.*

- *"Waste Away Contracts," (See "Clara Clutter" activity, p.62)*
- *paper*
- *pencils*

WASTE TIME LINE

Objective: *To visually demonstrate the approximate length of time different types of waste persist.*

Subjects: *Math, science, environmental education*

Procedure: *Using a long string (one inch could equal one year) create a time line beginning with the present date. Using the following statistics, place the items in the appropriate places on the string.*

Paper napkins	1 year
Orange & banana peels	2 years
Wool socks	4 years
Newspapers	5 years
Plastic coated paper plate	5 years
Plastic bags	20 years
Nylon fabric	40 years
Tin (steel) cans	50 years
Plastic six-pack holders	100 years (or 1 year if photodegradable and exposed to sunlight)
Plastic cups	250 years
Aluminum cans & tabs	500 years
Glass bottles	1,000,000 years

- *string*
- *items or cards listing items*
- *paper clips to attach cards to strings*

In The School:

REDUCE SCHOOL PAPER WASTE

Objective: *To reduce school paper waste.*

Subject: *Language arts, environmental education*

Procedure: *Assign a small group of students to each classroom (if the teacher is willing) to demonstrate their "Reduce Paper Waste Project." (See "Session I: Follow-Up Activities," p.9). Encourage the other classes to do the project as well.*

DISPLAYS

Display the "Waste Time Line" and "Contract Review" essays (p.64) in the halls.

RECYCLING AT HOME

Objective: *To encourage recycling.*

Subjects: *Language arts, environmental education*

Procedure: *Share the results of the "Recycling Survey" (see below). Ask children in the other classes if they recycle at home. If they don't, they should be encouraged to discuss the idea with their families.*

LUNCH WASTE GRAPH

Objective: *To share information and reduce school lunch waste.*

Subjects: *Language arts, environmental education*

Procedure: *Have students discuss the results of the "Lunch Waste Graph" (p.40) with the rest of the school, including the cafeteria staff and principal. Brainstorm ideas of reducing lunch waste. Investigate the possibilities of separating waste, recycling and composting or giving edible waste to a nearby pig farm. Suggest using reusable items instead of throw-away containers.*

In The Community:

RECYCLING SURVEY

Objective: *To have the children obtain information about community recycling and share information about the Waste Away program.*

Subjects: *Language arts, social studies, math, environmental education*

(continued on next page)

RECYCLING SURVEY (cont.)

Procedure: *Have each child survey two adults she/he knows in the community asking whether or not they recycle. If they do not, find out what would help them to recycle. Have the children share information about the Waste Away program and invite the adults to the Trash Festival.*

The children should share their results with the class and determine the percentage of recyclers and nonrecyclers.

FIELD TRIPS

Objective: *To learn how the town deals with trash.*

Subjects: *Environmental education, social studies, science language arts*

Procedure: *Visit a landfill, transfer station or recycling collection center. If possible, arrange ahead of time for an operator to be present to provide information and answer questions. Brainstorm questions with the children ahead of time.*

A noncollecting scavenger hunt can be held at the landfill. Examples might include finding something which could have been recycled, something nonbiodegradable, something that could be reused, something made of nonrenewable resources, something no one ever needed. Other questions might include:

-- *Close your eyes. What do you hear? Smell?*
-- *Where did the garbage come from (domestic, commercial, industrial)?*
-- *Where does the leachate go?*
-- *Are houses close to the site?*
-- *Would you like to live near the landfill? Why or why not?*
-- *What happens when the landfill gets filled with garbage?*
-- *What is the projected life of the landfill?*
-- *What happens to the garbage that gets buried?*

At Home:

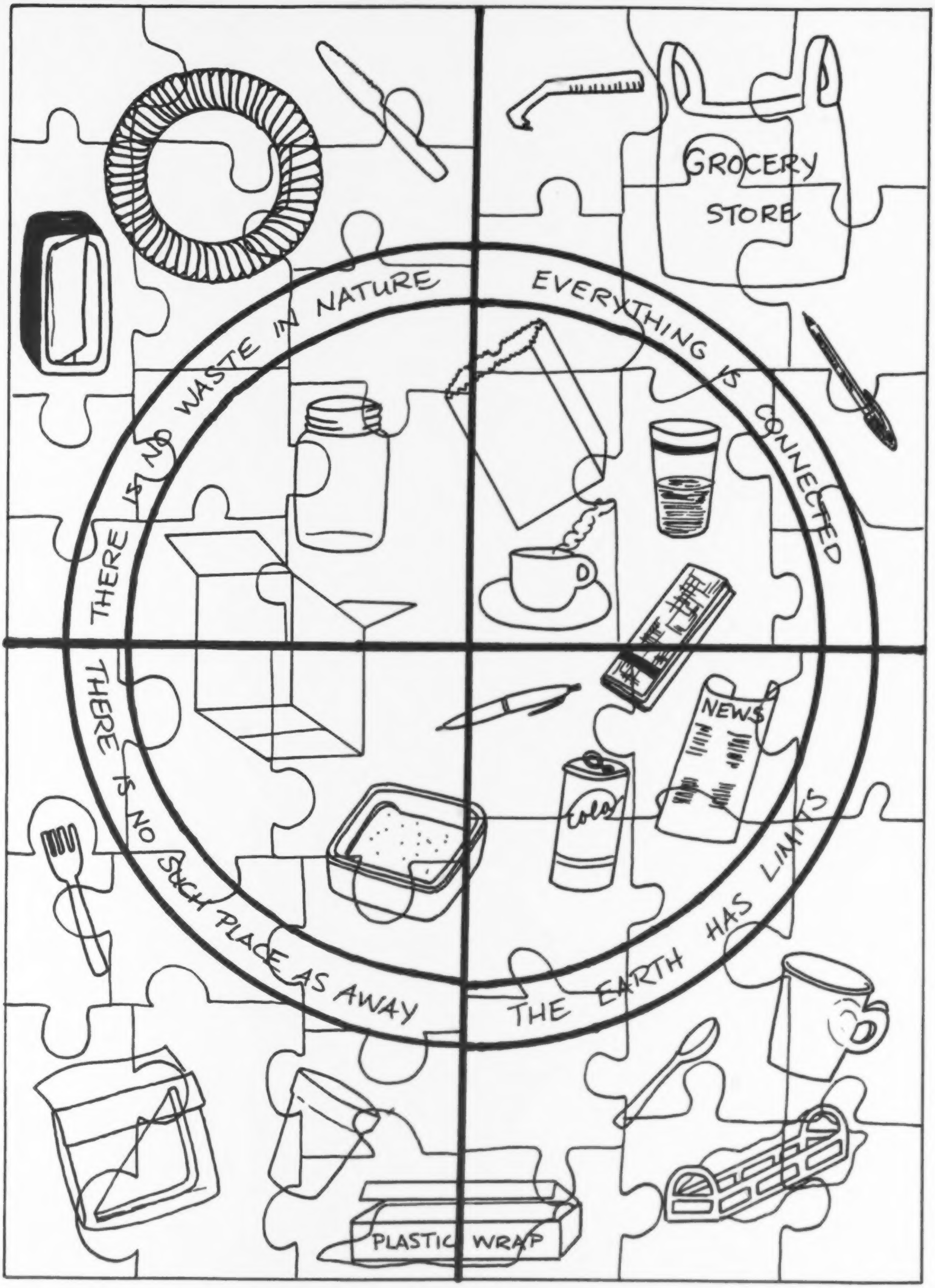
HOUSEHOLD HAZARDOUS WASTE

See Home Booklet.

For The Festival:

See "Displays" (p.65).
See "Trash Festival Activity Ideas" in Appendices (p.86).

WASTE PUZZLE



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WASTE AWAY CONTRACT

I ______________ pledge to do the following to help reduce solid waste:

____

____

____

____

____

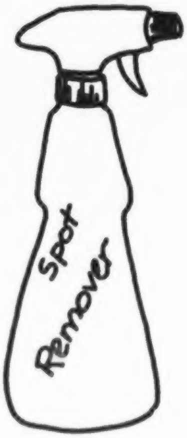
____

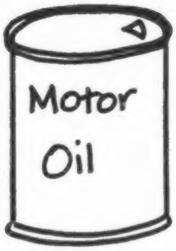
______________ date

______________ signature

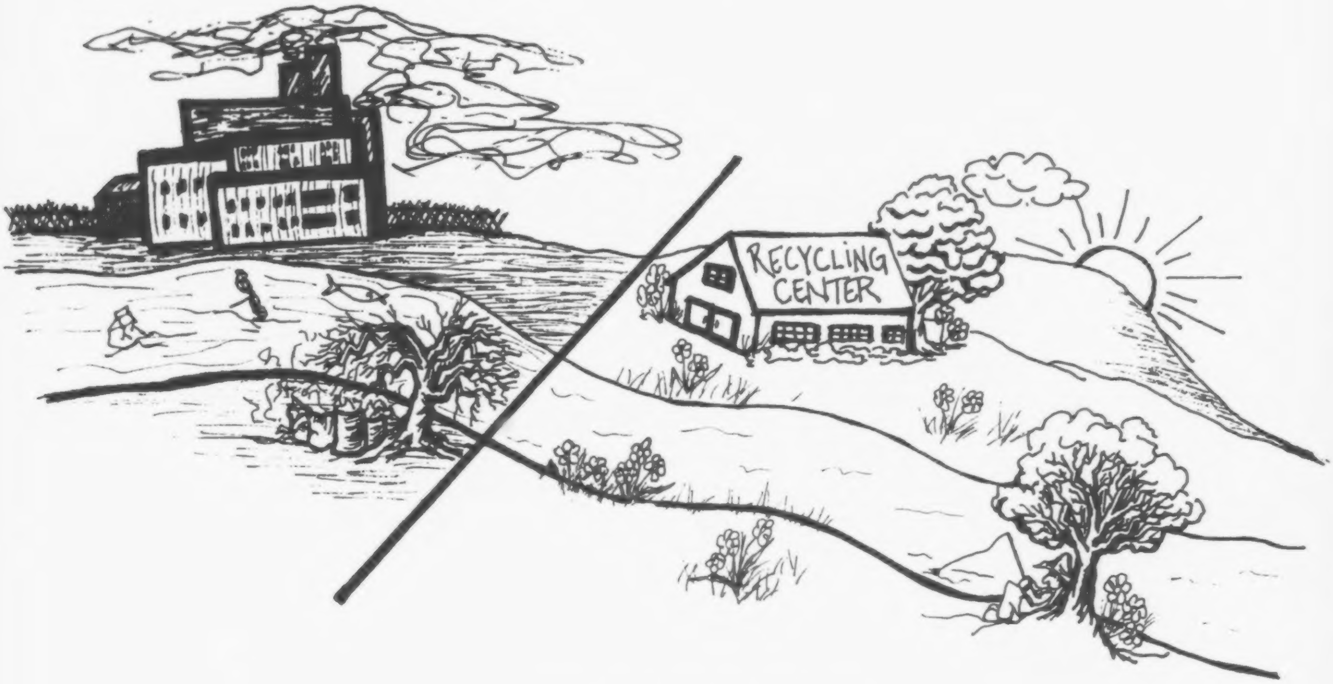
HOUSEHOLD HAZARDOUS WASTE -- Worksheet

Directions: *Circle the products you think you will find in your home.*





[Adapted with permission from Oscar's Options, Rhode Island Department of Environmental Management.]



ROADBLOCKS TO SOLVING THE SOLID WASTE PROBLEM

Industry

Currently, the consumer product industry caters to a society which prefers convenient, use-and-throw-away products. The packaging industry, in particular, often places ease of use and/or disposal before ecological concerns. As a result, many new consumer products present difficult solid waste problems. Disposable diapers are prime examples. Each year about 5 million tons of disposable diapers enter our country's landfills. Annually, consumers spend more than 1 billion dollars to dispose of diapers alone.[1]

Technology

Related to industry is technology. Solid waste disposal technology is a dynamic field. Every day new facts are learned about landfills, incinerators, composting and even solid waste. Still, we have much to learn.

Market Demand

It's been said that consumer products merely reflect the demands of the people who buy them. Certainly, that's true to a large extent; so if we as consumers wish to have more ecologically sound products available to us, we must demand them. We can look for the made-from-recycled-materials symbol ♻ on the products we buy and choose items sold in reusable, recyclable or biodegradable packaging. At times, we may have to pay extra for these items; but as demand for them rises, their prices will probably fall. We can also suggest that our state earmark a portion of its waste-disposal dollars to develop new markets for recycled products. Halting federal subsidies for the extraction and transportation of virgin materials would increase the incentive for companies to use recycled materials.

Lack of Knowledge

Lack of consumer knowledge is the most significant roadblock to solving the solid waste problem. Many people simply don't realize that their day-to-day purchases and actions have significant impacts on the environment. Developing consumer awareness is the most important contribution we can make towards solving the solid waste crisis.

WORKING TOGETHER TOWARD SOLUTIONS: WHAT WE CAN DO

Reduce:

- Buy fewer new products.
- Share items with friends, co-workers, neighbors (e.g., lawn mower).
- Buy food in bulk (or large packages).
- Buy durable, repairable products.
- Reduce purchases of nonrecyclable items.
- Buy items with minimal packaging.
- Patronize businesses offering recyclable or biodegradable products or packaging.
- Bring your own shopping bags.
- Bring your own coffee mug.
- Share a magazine subscription or book with a friend.
- Use your library instead of buying books and magazines.
- Request "no bag" for small purchases.
- Use cloth napkins and kitchen towels.
- Write the manufacturers of over- or poorly-packaged products.
- Reduce junk mail by writing The Direct Marketing Association at 6 East 43rd St., New York, NY 10017, and ask to be eliminated from any new mailing lists.[2] To get off of existing mailing lists, write or call the companies directly. Many companies have toll-free numbers and postage-paid envelopes.

Reuse:

- -- *Reuse plastic and paper bags.*
- -- *Reuse glass and plastic jars and containers.*
- -- *Compost your organic waste.*
- -- *Buy returnable containers.*
- -- *Maintain and/or repair existing products.*
- -- *Give outgrown clothes and unwanted items to charities.*
- -- *Write notes on used envelopes and scrap paper.*
- -- *Donate ribbon pieces, egg cartons, etc., to preschools.*
- -- *Use comics for wrapping paper.*
- -- *Wear hand-me-down clothes.*
- -- *Return wire coat hangers to the cleaners.*
- -- *Make double-sided copies when using copier machines.*

Recycle:

- -- *Recycle paper, plastic, metal, glass, motor oil, etc.*
- -- *Use and buy recycled products.*
- -- *Request recycled paper for photocopying.*
- -- *Purchase recycled paper stationery and office paper. (Send for a free catalog from such companies as Earth Care Paper Company, 100 S. Baldwin St., Dept. 64, Madison, WI 53703, or Brush Dance, 218 Cleveland Court, Mill Valley, CA, 94941.)*
- -- *Ask your bank, phone, gas, and power companies to use recycled paper for their bills, notices, and statements.*
- -- *Ask your employer to use recycled paper and to recycle in general.*

For further information about recycling, contact your local or state solid waste manager. The above suggestions are only a partial list of the many ways individuals can contribute toward solving the solid waste problem. As a teacher and role model, the influence you can have on your students is immeasurable. Working together, you and your students can help to educate others and to improve the solid waste situation. Good luck.

NOTES

1. Rhode Island Solid Waste Management Corporation, Annual Report, 260 West Exchange St., Providence, RI, 02903, 1986.

2. The Connecticut Fund for the Environment, "Don't Throw This Away", 152 Temple St., New Haven, CT, 06510, 1987.

WE CAN MAKE A DIFFERENCE

SESSION IV

Focus: *There are things that we as individuals can do now to reduce the amount of solid waste.*

Subjects: *Social studies, science, math, environmental education*

Vocabulary: *Roadblock*

Activities

Materials

CLARA CLUTTER CONTRACTS

Objective: *To remind students of their intentions to reduce waste and present the concept of roadblocks.*

Procedure: *Pass out each student's contract. Ask them to silently reread their own and think about whether or not they were able to accomplish what they had hoped. Discuss which ones were "do-able" and what kept others from being accomplished. Introduce the latter as roadblocks.*

- *"Waste Away Contracts," (See "Clara Clutter" activity, p.62)*

ROADBLOCK RAMBLE ♥♥

Objective: *To examine some roadblocks to recycling and how they can be overcome.*

Procedure: *Provide four-fifths of the students with roadblock signs using some of the roadblocks they mentioned. Examples might include: I keep forgetting, others don't help, not enough time, no transportation, storing recyclables is too messy, not enough room, product I want is excessively packaged, friends think it's strange, recycling center is too far away, it's too much trouble. The remaining students will be Ramblers--people working on solutions to the solid waste problem. Blindfold the Ramblers at one end of the playing area and put the "Solid Waste Solutions" sign at the other end. The roadblock students, with signs on, create an obstacle course between the Ramblers and the "Solutions" sign. The roadblocks cannot move their hands and feet once they choose a position. Face the Ramblers toward the roadblocks and ask them to try to reach the solutions.*

- *roadblock signs on neck loops*
- *blindfolds*
- *"Solid Waste Solutions" sign*
- *large open room or outdoors*

(continued on next page)

♥♥ - *Activities for which volunteer assistance would be helpful.*

ROADBLOCK RAMBLE (cont.) ♥♥

Discuss what happens after a few tries. (Some bump into obstacles.)

- -- *Why is it happening? (There are too many obstacles.)*
- -- *What can be done to help? (Get others to help; decrease number of obstacles.)*
- -- *How can this be done? (Educate; turn roadblocks into helpers.)*
- -- *Which ones can be overcome?*
- -- *Which ones will take the most/least work to change?*

Turn many of the roadblocks into helpers (e.g. "No transportation" can get a ride with a neighbor, "I keep forgetting" can ask someone to remind him/her). Face the blindfolded Ramblers towards the remaining roadblocks. The children who have been removed as roadblocks can be helpers by attempting to guide the Ramblers to the solutions. The helpers must stay outside the playing area; they can give advice but cannot touch the Ramblers.

Discuss:

- -- *Can we apply this game to real life?*
- -- *How else can we encourage people to help? (education, bottle bills, financial incentives, mandatory recycling, packaging controls)*

SOLUTION SIMULATIONS ♥♥

***Objective:** To have students realize what roadblocks they personally face and possible methods for overcoming them.*

- roadblock signs

***Procedure:** Divide the class into groups of four or five and give each group a different roadblock sign from previous activity. Allotting about five minutes for preparation, each group must role-play the roadblock and a possible solution for the rest of the class. The class then determines which roadblock is being presented and how it was overcome. Open up the floor for other suggestions.*

TIME MACHINE ♥♥

***Objective:** To simulate the composting and degrading processes. To demonstrate the persistence of hazardous waste and nondegradable items.*

- wizard hat decorated with trash
- time machine
- table
- tablecloth or sheet
- three small dishes
- kitchen scraps
- compost
- humus

(materials continued on next page)

***Procedure:** Before class, drape a table with a cloth so that the children can't see under the table. When the children aren't looking, have an assistant hide behind the table. Place the back of the time machine towards the back of the table so that the assistant can substitute what goes inside without the children seeing. The time machine can be made from a large cardboard box with closable front and back flaps. See p.80 for diagram of the front of the box. A movable arrow should be attached to the clock that has the seasons. The box can be brightly colored.*

Wearing the wizard hat, explain that you, with the help of a time machine, will show what happens to food waste over time.

(continued on next page)

TIME MACHINE (cont.) ▼▼

Open the front flap of the time machine and place inside of it a pile of vegetable, fruit and bread scraps on a dish, then close it. Move the dial from spring to summer, representing the passage of one season. Explain that several months have passed. (At this point your assistant should have opened the back flap of the time machine and substituted a dish of partly composted food for the food scraps.) Open the front flap, which will now "magically" display a pile of compost material. Repeat for a second season, this time displaying a dish of humus (see glossary for definition). Discuss composting (see p.26) and explain how it is another solution to the waste problem.

Now show the children a plastic bottle of laundry stain remover and place it in the time machine. This time turn the dial so that several years have gone by. When the front flap is opened a crushed bottle similar to the one that contained the stain remover and a clear glass of dirty water colored with yellow food coloring (representing leachate) should be revealed. Discuss the fact that plastic does not biodegrade. Also review the concept of leachate (see p.49). Explain that stain remover is one type of household hazardous waste. Discuss alternative stain removers (lemon juice, club soda, baking soda). Encourage the children to refer to "Household Hazardous Waste - Some Options" in their Waste Away Home Booklet.

- clear glass
- dirty water with yellow food coloring
- stain remover
- crushed container

ONE STEP FURTHER ▼▼

Objective: To connect good intentions with positive actions.

Procedure: Discuss the following:

-- Knowing what you know now about solid waste and the problems and solutions involved, what will be your next step?
-- How much are you willing to do?

Explain what an auction is. On the blackboard, make a master chart with 3 columns labelled "Item", "Trade Value," and "Team." Divide the class into groups of three or four. Give each group a "Bidding Chart," pencil and 50 trading pieces. Students should list the displayed items they want most and the highest amount they are willing to trade for each.

The auctioneer chooses any item and begins the auction taking bids in increments of five to keep it moving quickly. Record on the master chart how much was traded for each item and which team won it. Continue until all items are gone, without stopping to discuss them. Have each group take the item as they win it and exchange it for trading pieces. Items might include stereo, case of candy, ten outfits, concert tickets, mountain bike, free movies for five years, telephone and free calling, horse and stable, wooden canoe and paddles.

- 50 trading pieces per group
- 8-10 auction items (objects, pictures or signs)
- "Bidding Charts," (p.81)
- pencils
- blackboard or newsprint & marker

(continued on next page)

After the sale, discuss each item:

- -- *Why did they bid for it?*
- -- *Why did they trade that amount?*
- -- *Are they glad to have it?*
- -- *What will they do with it now? In ten years?*
- -- *Is it reusable? Biodegradable? Recyclable? Renewable?*
- -- *Where will it end up?*

Discuss the necessity of revising our habits and lifestyle.

I CAN MAKE A DIFFERENCE

Objective: *To empower students to help solve waste problems.*

Procedure: *Suggest to the children that it is now their turn to be educators. Present an "Educator for the Future" certificate to each child with his/her name on it. The certificate must be signed by someone the student has told about the solid waste problem. Display the signed certificates below a banner reading, "The _____th grade is helping to solve the solid waste problem by spreading the word."*

- *"Educator for the Future" certificates. (p.82)*

In Class:

REDUCE, REUSE, RECYCLE (posters)

- *blackboard*
- *poster board*
- *pencils*
- *markers*

Objective: *To review and share information learned.*

Subjects: *Art, language arts, social studies, science, environmental education*

Procedure: *Write the headings "Reduce," "Reuse," and "Recycle" on the board. Brainstorm some things the children could do for each category and write these under the appropriate heading. Some examples are:*

Reduce -- ice cream on a cone instead of in a plastic dish
Reuse -- cloth napkins instead of paper
Recycle -- buy food in recyclable containers
(Note: The lists may overlap.)

*Divide the children into small groups. Assign each group a topic ("Reduce," "Reuse," or "Recycle.") Tell them that they are to design and then make posters to advertise their category. These posters will be on display in the school and at the Trash Festival. Illustrations from "**Waste Away**" magazines might be used.*

"SARAH CYNTHIA SYLVIA STOUT" (a poem)

- "Sarah Cynthia Sylvia Stout," (p.83)

Objective: *To share a poem about garbage and think of ways to reduce trash.*

Subjects: *Language arts, environmental education*

Procedure: *Read the poem "Sarah Cynthia Sylvia Stout" to the children. Discuss specific ways Sarah could decrease the amount of garbage by applying the 3 R's.*

In The School:

SCHOOL RECYCLING PROGRAM

Objective: *To reduce the amount of school waste and to save natural resources.*

Subjects: *Environmental education, social studies, language arts*

Procedure: *Refer to the "School Recycling Program" (p.88)*

WASTE AWAY DISPLAYS

Objective: *To continue sharing information and the efforts of the students with the rest of the school.*

Subjects: *Environmental education*

Procedure: *Display signed "Educator for the Future" certificates for the rest of the school. (See "I Can Make A Difference," p.76) Other classes could be encouraged to make their own certificates.*

Display "Reduce," "Reuse," and "Recycle" posters (p.77).

IN THE COMMUNITY:

MEET THE PRESS

Objective: *To inform as many people in the community as possible. To teach the students about newspaper reporting.*

Subjects: *Language arts, social studies, environmental education*

Procedure: ***Invite the press to come to the classroom and interview your class about the Waste Away Project. Encourage the press to take pictures. Announce the date of the Trash Festival. Some students should also contact the radio stations and put up posters in town.***

AT HOME:

THE 3 R'S FAMILY AGREEMENT

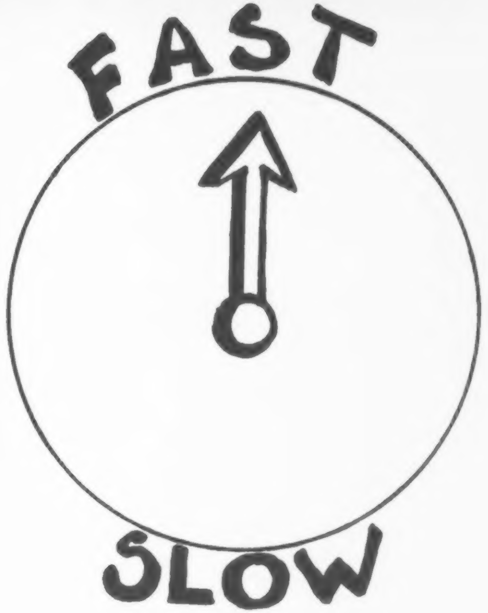
Each child should write a letter to their parents explaining what their class, school and they as individuals are doing to reduce the waste problem.

See Home Booklet. Brainstorm ideas for what students can do to encourage family participation.

FOR THE FESTIVAL:

Consult "Planning For a Trash Festival" (p.84) and "Trash Festival Activity Ideas" in the Appendices (p.86).

Meet with the volunteer coordinators.


FAST
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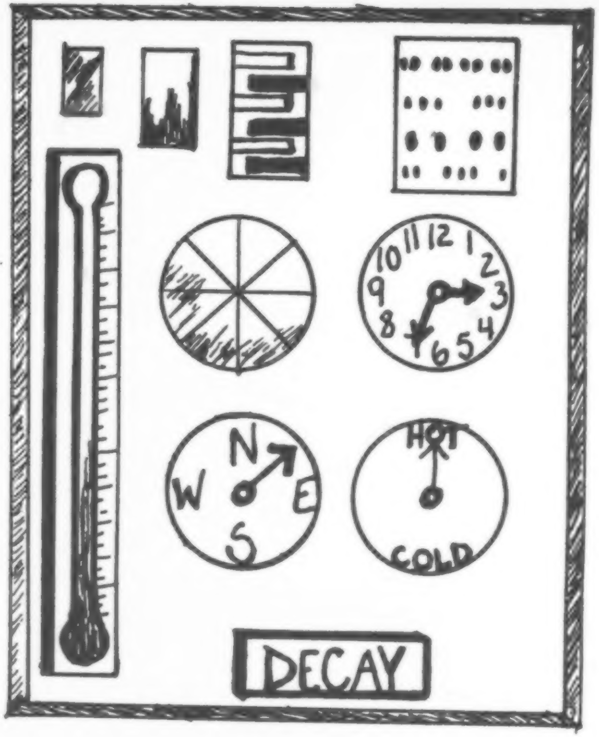
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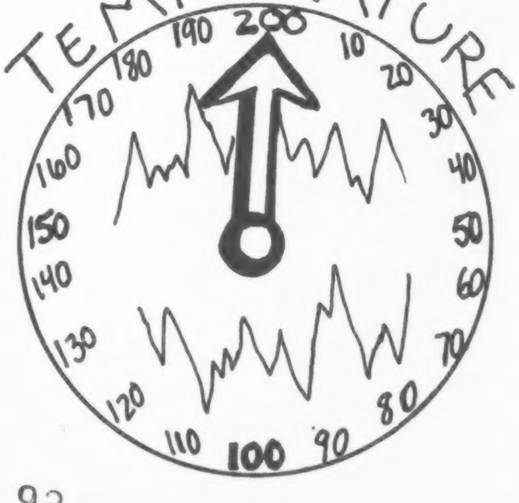
TEMPERATURE
200
10
20
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90
100
110
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130
140
150
160
170
180
190

93

SPRING
SUMMER
FALL
WINTER
INSERT ARROW HERE

94

BIDDING CHART

ITEM	HIGH BID	TRADED

BIDDING CHART

ITEM	HIGH BID	TRADED

Note: Cut along middle line after making copies. There are two bidding charts on this page to reduce paper waste.

WASTE AWAY

WASTE AWAY

EDUCATOR FOR THE FUTURE

THERE IS NO WASTE IN NATURE
EVERYTHING IS CONNECTED
THE EARTH HAS LIMITS
THERE IS NO SUCH PLACE AS AWAY

_______________ has explained to me
student's name
what some Solid Waste Problems are and has given me some suggestions on ways that I can help solve them.

____
signed

____
date

WASTE AWAY

WASTE AWAY WASTE AWAY

WASTE AWAY

WASTE AWAY

EDUCATOR FOR THE FUTURE

THERE IS NO WASTE IN NATURE
EVERYTHING IS CONNECTED
THE EARTH HAS LIMITS
THERE IS NO SUCH PLACE AS AWAY

_______________ has explained to me
student's name
what some Solid Waste Problems are and has given me some suggestions on ways that I can help solve them.

____
signed

____
date

WASTE AWAY

WASTE AWAY WASTE AWAY

WASTE AWAY

WASTE AWAY

EDUCATOR FOR THE FUTURE

THERE IS NO WASTE IN NATURE
EVERYTHING IS CONNECTED
THE EARTH HAS LIMITS
THERE IS NO SUCH PLACE AS AWAY

_______________ has explained to me
Student's name
what some solid Waste Problems are and has given me some suggestions on ways that I can help solve them.

____
Signed

____
date

WASTE AWAY

WASTE AWAY WASTE AWAY

"SARAH CYNTHIA SYLVIA STOUT"

by Shel Silverstein

Sarah Cynthia Sylvia Stout
Would not take the garbage out,
She'd wash the dishes and scrub the pans
Cook the yams and spice the hams.
And though her parents would scream and shout,
She simply would not take the garbage out.
And so it piled up to the ceiling:
Coffee grounds, potato peelings,
Brown bananas and rotten peas,
Chunks of sour cottage cheese.
It filled the can, it covered the floor,
It cracked the windows and blocked the door,
With bacon rinds and chicken bones,
Dripply ends of ice cream cones,
Prune pits, peach pits, orange peel,
Gloppy glumps of cold oatmeal,
Pizza crusts and withered greens,
Soggy beans, and tangerines,
Crusts of black-burned buttered toast,
Gristly bits of beefy roast.
The garbage rolled on down the halls,
It raised the roof, it broke the walls,
I mean, greasy napkins, cookie crumbs,
Blobs of gooey bubble gum,
Cellophane from old bologna,
Rubbery, blubbery macaroni,
Peanut butter, caked and dry,
Curdled milk, and crusts of pie,
Rotting melons, dried-up mustard,
Eggshells mixed with lemon custard.
Cold French fries and rancid meat,
Yellowed lumps of Cream of Wheat.
At last the garbage reached so high
That finally it touched the sky,
And none of her friends would come to play,
And all the neighbors moved away;
And finally, Sarah Cynthia Stout
Said, "Okay, I'll take the garbage out!"
But then, of course, it was too late,
The garbage reached across the state,
From New York to the Golden Gate,
And there in the garbage she did hate
Poor Sarah met an awful fate
That I cannot right now relate
Because the hour is much too late
But children, remember Sarah Stout,
And always take the garbage out

["Sarah Cynthia Sylvia Stout Would Not Take the Garbage Out" from WHERE THE SIDEWALK ENDS by Shel Silverstein. Copyright (c) 1974 by Evil Eye Music, Inc.
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A. PLANNING FOR A TRASH FESTIVAL

*INTRODUCTION: This set of directions for planning a Trash Festival is meant to HELP you, not boggle your mind. Please use only what's right for you. Starred (*) items indicate areas we think are most important. Other items may or may not apply.*

WHY A FESTIVAL?

THE FESTIVAL CAN:

1. *Draw people together to have fun.*
2. *Give the children a chance to share what they've learned.*
3. *Inform the community about waste problems and alternative solutions.*
4. *Demonstrate how to reduce, reuse and recycle.*
5. *Encourage commitment by individuals, families, the school and the community to practice the 3 R's.*

WHO SHOULD PARTICIPATE?

IN THE ORGANIZING?

* 1. *The students, teachers and volunteers directly involved in Waste Away*
2. *Other classrooms that want to help*
* 3. *Community recycling committee members*
4. *Town service organizations or clubs such as Rotary, Lions, Snowmobile Club, Garden Club*

IN THE FESTIVAL ITSELF?

* 1. *The whole school*
* 2. *Community people*
* 3. *Local recycling committee members*
4. *Local businesses*
5. *Local or state officials*

FIRST STEPS/EARLY DECISIONS

****SCOPE OF FESTIVAL--LARGE OR SMALL?***

1. *Large? I.e., a Saturday Trash Festival with booths, games, food, information, "green-up" campaign, recycling project (See "School Recycling Program," p.88 and "Trash Festival Activity Ideas" p.86).*
2. *Small? I.e., a couple of booths/displays at an annual school or town function*

****DATE AND PLACE FOR FESTIVAL?***

Clear it with and add it to school, town and recycling committee calendars.

STEERING COMMITTEE SET UP

* 1. ***Chairpeople: Waste Away volunteer coordinator and member of local recycling committee***
2. ***Subcommittees to reflect scope of Festival***
    a. ***Each with a chairperson, students and other adults***
    b. ***Might include publicity, finances, information, site planning, booths, games, refreshments, school recycling, etc.***

BUDGET

1. Spending allowance
2. Funding sources

STEP BY STEP PLANNING

TIE IN TO WASTE AWAY SESSIONS AND MATERIALS

* 1. Consider at least one follow-up activity per session as preparation for the festival (poster contests, surveys, graphs).
* 2. Copy fact sheets from Home Booklet to hand out.

SITE PLANS

* 1. OK to use site? When will it be available for set up?
2. Sketch a map of what goes where.
3. Rainy day alternatives
4. Trash receptacles
5. Parking
6. Directional signs/posters to show the way

PUBLICITY

* 1. A.S.A.P. Get date, place, and brief description of the festival into newspapers and onto local organizations' calendars.
2. Build toward the day, perhaps include:
    a. Newspapers--articles and pictures by kids
    b. Posters from poster contest
    c. Radio--appearance on talk show, community calendar announcements
    d. TV--invite local station to classroom during Waste Away session and/or to festival
    e. Local publications--school, church, clubs, and town publications
    f. Notices home with children

SUBCOMMITTEES GET TO WORK

Consider the following:

* 1. What needs to be accomplished?
* 2. Schedule--by when must each segment of the job be done?
* 3. Who will do it?
4. Where will materials/funds come from?
5. Transportation--i.e., truck to haul things.

STEERING COMMITTEE

1. Keep on top of subcommittees' progress.
2. Encourage and praise.
3. Serve as liaison among committees, school, recycling group, etc.

CLEAN UP PLANS

* 1. Who will do it?
2. Where will the stuff go?
3. When will it be done?
4. Transportation?

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B. TRASH FESTIVAL ACTIVITY IDEAS

The following ideas are meant to encourage your own creative thinking about the festival. Any adaptations and new activities will make the celebration more personal and meaningful for your group.

-- Perform the puppet show (p.12) at scheduled times throughout the day.

-- Display "Waste Problems Posters" (p.8) near stage or entrance.

-- Display items of disposable/reusable; recyclable/nonrecyclable; natural/synthetic; recycled/unrecycled product; etc. and define the terms (see glossary).

-- Create a display of common household hazardous wastes (see Household Hazardous Waste Worksheet p.69). Provide alternatives for people to test and compare. Use the "Household Hazardous Waste - Some Options" sheet from the home booklet as a handout for people to take home.

-- Time how quickly people can sort the items from a bag of trash into the proper containers using the same terms as above. Keep the names of the three fastest on a board so others can try to beat them. Deduct one second for each mistake.

-- Display the graph from "Reduce School Paper Waste" (p.65).

-- Write songs about solid waste and perform them on stage. Conduct a garbage jamboree using trash to create musical instruments.

-- Host a crossword puzzle game show for contestants to try to fill in the crossword puzzle (p.8).

-- Rehearse and act out The Lorax (p.37) for the audience, then write the "next chapter" from one or more viewpoints and act them out.

-- Display several packaged items and the students' creations for alternative packaging from "Designs for Waste" (p.37).

-- Ask participants to sign a letter written by the students from "Letters about Packaging" (p.38). Offer participants pens and paper to write a quick note themselves to be mailed along with the children's letters.

-- Have participants try to match up trash items with the appropriate time it takes to break down (see "Waste Time Line" p.64).

-- Illustrate and caption every two lines of the poem "Sarah Cynthia Sylvia Stout" (p.83) and display these in order.

-- Have a "Weigh Station" where people can try to weigh out 3.5 and 5.5 pounds of trash (see "How Much Is It" p.60).

-- Make and sell compost bins.

-- Have papermaking going on (see "Recipe for Recycled Paper" p.9). Sell packages of recycled cards the students have previously made.

-- Have a booth selling baked goods or popcorn and on a display explain how all food is actually recycled nutrients from decomposed waste (see background information p.26). Make a sign calling it a "Recycled Food Stand".

-- Set up a maze of solid waste roadblocks (p.73) and see if people can find their way out of the garbage mess.

-- Have "Clara Clutter" (p.62) hand out contracts for people to fill out. Display these on a board for all to see.

-- Perform "Solution Simulations" (p.74) to help give people ideas on how to overcome some of the roadblocks they face. If you're really feeling creative, set up an improvisational theater in which people offer roadblocks and the actors perform a solution!

-- Give tours of the school's recycling program (p.88). Explain how each step is done and where the recyclables go.

-- Organize a town clean-up day or coordinate with the town Green-up Day committee.

-- Create a trash museum displaying different trash items. Make garbage sculptures and clutter collages.

-- Set up a display of items including tin (steel) and aluminum cans, HDPE and PET plastics, mixed plastics, different colored glass (some with caps and rings left on), aluminum foil and pans, cardboard, wax-coated and plastic-coated cardboard, glossy and office paper, etc. Have people try to sort which ones are recyclable under the categories : aluminum, glass (clear, brown, green), tin, HDPE, PET, cardboard, paper (white, mixed, colored). Have a magnet available for differentiating between aluminum and steel.

-- Display the "Educator for the Future" certificates (p.82) and offer people their own to fill out.

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C. SCHOOL RECYCLING PROGRAM

The goal of Waste Away is to have children and their families reduce, reuse, and recycle. A school recycling program will help the children succeed in reducing the waste stream at school and hopefully at home as well.

The following are some how-to suggestions for getting a recycling program going in your school.

INITIATING THE PROGRAM

1. *Set up a school recycling committee with broad representation on it (e.g., students, teachers, volunteers, recycling committee members).*
2. *Contact your state solid waste managers, your solid waste district manager or local recyclers to find out local recycling options and exact specifications for different categories of recyclables.*
3. *Talk over recycling possibilities with administrators, teachers, custodians and cafeteria staff.*
    - a. *Consider collection, containers, storage, transportation and management.*
    - b. *Discuss financial advantages (less trash) and start-up costs.*

PLANNING THE PROGRAM

1. *Decide which materials will be collected and how, based on:*
    - a. *What can be recycled locally, and what volume is necessary to avoid fees?*
    - b. *How much storage space can the school allocate for recycling?*
    - c. *Who in the school is willing to oversee various parts (e.g., cafeteria staff, classroom teachers, etc.)?*
    - d. *Who from outside the school will help?*
    - e. *Overall enthusiasm.*
    - f. *Budget considerations (are funds available for storage containers, etc.).*
    - g. *Whether there is a local hauler to pick it up.*
2. *Figure out when it can begin and whether part of the school should pilot the program or the whole school should be involved.*
3. *Initiate the school's participation.*
    - a. *Announce the recycling program--when it will start and what will be collected.*
    - b. *Place labelled receptacles throughout the school as appropriate (e.g., cardboard boxes, color-coded waste baskets).*
    - c. *Explain exact procedures to all concerned.*
        - (1) *What goes where--in the classroom, in the cafeteria and in the storage room.*
        - (2) *How recyclables should be prepared (e.g., cardboard boxes flattened, newspapers tied).*
        - (3) *When and by whom (students, custodian) it will be collected from the containers and taken to the storage room.*
        - (4) *When and by whom it will be hauled away from the school.*

IMPLEMENTATION

1. Deck the halls with posters.
2. Use the P.A. system--song, mystery trash items, etc.
3. Inform parents through school newspaper.
4. Use local media--invite or send announcements to newspaper, radio, TV.

START-UP DAY

1. Congratulate and thank everyone.
2. Have Clara Clutter, in costume, visit to inspire recycling efforts.

RECYCLING COMMITTEE LEADERSHIP

1. Meet regularly to assess program.
2. Handle even small problems quickly, before the molehill becomes a mountain.
3. Use a bulletin board for recycling news, amount of waste recycled, money saved, student "Recycler of the Week" or classroom "Clara Clutter Award" for most recycled, etc.
4. Be sure the system is working--if not, change it even if it means limiting the scope of the program. A small success is better than a large flop!
5. Place a recycling thermometer on the school front lawn.

MAKE RECYCLING AN IMPORTANT PART OF ALL SCHOOL AFFAIRS

1. Tell visitors about it.
2. Provide tours during an open house.
3. Mention it on report cards if students are involved.
4. Include it in faculty meeting agendas.

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D. ROLE OF WASTE AWAY CLASSROOM TEACHER

BEFORE THE PROGRAM:

-- Be concerned about solid waste issues and be willing to work for solutions.
-- Be prepared to commit a minimum of 24 hours of classroom time and eight hours of preparation time.
-- Win approval for Waste Away program from administration, teachers, custodian, kitchen staff and secretaries. Encourage them to think of themselves as part of the project.
-- Find a minimum of four volunteers to help with the program. One of the volunteers should be the volunteer coordinator (see "Role of Waste Away Volunteer" p.91).

TO GET THE PROGRAM UNDERWAY:

-- You may choose to give your students the pre-survey to reflect present knowledge and attitudes (p.95).
-- Review the Waste Away materials.
-- Discuss with other teachers how their classrooms might participate.
-- Send parents a letter to explain the Waste Away Program (sample parent letter p.94).

FOR THE WASTE AWAY SESSIONS:

-- Allow a total of two hours for each of the four sessions.

BETWEEN THE SESSIONS:

-- Select follow-up activities.
-- Meet with the volunteers to talk about their roles in conducting the activities.
-- Encourage children and their parents to use the Home Booklet and its activities.
-- Conduct, or see that volunteers conduct, follow-up activities.
-- Assist with the Trash Festival planning, as appropriate.

AFTER THE FOUR SESSIONS:

-- Do your part, which will vary from school to school, to make the Trash Festival happen. (See "Planning For a Trash Festival," p.84 and "Trash Festival Activity Ideas", p.86).
-- Implement the children's and your reduce, reuse, recycle plans.
-- Give children the post-survey to assess changes in knowledge and attitudes.
-- Encourage school recycling and other waste conscious programs.
-- Be at the Festival.

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E. ROLE OF WASTE AWAY VOLUNTEER

The following is a flexible guide to help potential volunteers assess the commitment involved in volunteering with the Waste Away project, and to give committed volunteers a range of responsibilities and opportunities. You need not be an expert; you need only care about resolving some of our trash problems and enjoy working with children. Welcome!

BEFORE WASTE AWAY STARTS:

-- Meet with the classroom teacher to discuss the Waste Away schedule and your involvement in the program.
-- Select a volunteer coordinator.
-- The volunteer coordinator will be responsible for:
  >> serving as the primary volunteer-teacher liaison
  >> coordinating and taking primary responsibility for the final Trash Festival
  >> coordinating the preparation and use of any special materials needed during the follow-up activity sessions
  >> overseeing the loan and use of the Waste Away manual including maintaining the "Follow-up Activity Schedule Form" (p.92)
  >> helping to promote the Waste Away project in the local media
-- Look over the entire curriculum.
-- Discuss how much input volunteers will have in various segments of the program.
-- Read up on local waste issues.
-- Find out about existing local recycling groups and their efforts.

DURING CLASSROOM SESSIONS:

-- Act as an attentive and enthusiastic role model for the students.
-- Help, as needed, with small group activities. (Your assistance is particularly needed with the activities marked with ▼▼.)
-- Think about which classroom session activities you (perhaps with some students) might bring to other classrooms.

BETWEEN CLASSROOM SESSIONS:

-- Meet with the classroom teacher to select follow-up activities and to decide who will lead each activity.
-- Schedule the time, location and, if necessary, transportation needed for each activity.
-- Prepare your activity (including materials, introduction, explanation and discussion).
-- Promote the Waste Away project and the upcoming Trash Festival in the local media (press releases, letters to the editor, radio, television, posters, etc.).

TRASH FESTIVAL:

-- With the assistance of the classroom teacher and students, plan and organize the Trash Festival.
-- Find interested community members and parents to help.
-- Be there during the festival.
-- See "Planning for a Trash Festival" (p.84) and "Trash Festival Activity Ideas" (p.86) for further information.

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FOLLOW-UP ACTIVITIES SCHEDULING FORM

SESSION I -- WASTE - WHAT IS IT?

ACTIVITY	LEADER	DATE	TIME
(sample) composting bin	Kathryn	Tues, Oct. 14	1:00-1:30

SESSION II -- THE ROOTS OF OUR WASTE PROBLEM

ACTIVITY	LEADER	DATE	TIME

SESSION III -- WASTE AROUND US

ACTIVITY	LEADER	DATE	TIME

SESSION IV -- WE CAN MAKE A DIFFERENCE

ACTIVITY	LEADER	DATE	TIME

Dear Parents:

Your child is about to become part of an exciting program. It is called Waste Away and will teach the children about trash--where it comes from, why there is so much of it, where it goes and, most importantly, what we can do about it.

Solid waste disposal is, or is fast becoming, an expensive problem for every community. Children, who understand how they can help, will help. Through activities at school and at home, children will be encouraged to think about ways they might reduce, reuse and recycle trash.

A Waste Away Home Booklet will be sent home with your child. It contains a brief information section that includes a list of common household toxics and some alternative products, as well as some activities you might enjoy doing with your child.

I need to find some volunteers to join us for our Waste Away sessions and help with some of the activities. After each session I plan to send small groups of children, led by one of the volunteers, to other classrooms to tell what they've learned or lead the other children through one of the activities. If you are interested in finding out more or in becoming a volunteer please give me a call.

Waste Away will finish up with a Trash Festival that will include activities and information booths. We hope you will join us there and, if you have time beforehand, help us to organize and set it up. Let me know.

I look forward to this as an important educational opportunity for all of us; your support will be much appreciated.

I am interested in any comments you have about Waste Away, so please pass them along.

Sincerely,

PRE/POST-SURVEY -- Directions

1. *Administer:*
   -- *the pre-survey at least one week before the program or before other information on solid waste is presented.*
   -- *the post-survey within one week after the final session.*

2. *Explain to the children that the following sheet is a survey to find out how they feel about garbage. Encourage the students to answer honestly and not to feel they must give a "correct" answer. Ask them to answer all questions as best as they can without skipping any. This is just to see how much they know about the topic and the surveys will not be graded.*

3. *Distribute one survey per student and have them fill in the name of their school, their full name and their grade.*

4. *Instruct the children to follow along as you read the survey and to answer only after a statement is read.*

5. *Read each statement aloud two times and allow time for them to answer; do not explain or define any survey statements.*

6. *After completing the survey, ask if there is any statement they would like read again. Place an "X" on your copy next to the statement number of any that the children find unclear.*

7. *Collect and save surveys for comparison.*

8. *Survey statistical evaluation: to determine the extent of attitudinal and cognitive change the surveys can be given a numerical grade and comparisons can be made.*

   For section I: (Likert scale) Give the central position a score of 0 and each position leading toward the positive answer a 1, 2, or 3, respectively and a -1, -2, -3 toward the negative answer.
   For section II: (Semantic Differential) Do as above giving DK=0, and +1, +2 leading toward the positive and -1, -2 to the negative response.
   For section III: Give all "sometimes" =0, and either +1 for the positive or -1 for the negative response.
   For section IV: Award +1 for all correct answers and -1 for incorrect answers.

   Add up the scores for each section for the overall survey grade. Compare those of the pre-survey and post-survey to determine any change that has taken place.

9. *The Vermont Institute of Natural Science would be interested in receiving a copy of your tallied comparative survey results. Please mail to: Waste Away, Vermont Institute of Natural Science, Box 86, Woodstock, VT 05091.*

School: ______________________ **Name:** ______________________

Date: ______________________ **Grade:** ______________________

PRE/POST-SURVEY -- Questions

Directions: Place an "X" on the scale between the words indicating where you feel your opinion falls.

Example:	*Special programs at school are usually....*	*fun*	☒ ☐ ☐ ☐ ☐	*not fun*
1.	*I think composting would be ....*	*easy*	☐ ☐ ☐ ☐ ☐	*hard*
2.	*The effect I can have on the solid waste problem is ....*	*small*	☐ ☐ ☐ ☐ ☐	*large*
3.	*I like to buy things that come in nice packages ....*	*often*	☐ ☐ ☐ ☐ ☐	*seldom*
4.	*Separating out recyclables before I throw out my garbage would be ....*	*easy*	☐ ☐ ☐ ☐ ☐	*hard*
5.	*The Waste Away program will be/was ....*	*boring*	☐ ☐ ☐ ☐ ☐	*fun*

Directions: Place an "X" in the column following each statement indicating how you feel. Do you Strongly Agree (SA), Agree (A), Don't Know (DK), Disagree (D), or Strongly Disagree (SD) with the statement?

		SA	*A*	*DK*	*D*	*SD*
Example:	*Recess is a good time to sit at my desk.*					X
1.	*Burying trash in a landfill is a good way to get rid of our solid waste.*					
2.	*It is possible for people to change the amount of garbage they make and throw away.*					
3.	*People are hurt by the problems caused by solid waste more than other animals and plants are.*					
4.	*Burning trash in a waste-to-energy incinerator is a good way to get rid of our solid waste.*					
5.	*Putting biodegradable materials into landfills is the best thing to do with them.*					

PRE/POST-SURVEY -- Questions (cont.) **Name:** ______________________________

Directions: *In the space before each statement mark "O" for Often, "S" for Sometimes, or "N" for Never to indicate how often you do these things.*

Example: __S__ *I forget to write my name on school papers.*

1. ______ *I throw litter on the ground.*

2. ______ *I try to avoid buying things made out of plastic.*

3. ______ *I turn off lights when I leave a room no one else is in.*

4. ______ *I walk or ride my bike to visit friends instead of asking to be driven.*

5. ______ *I ask for "no bag" when I purchase something that does not need a bag.*

Directions: *Circle the letter of the __most__ correct answer.*

Example: *The best place for a broken pen is ....*

a. *on the floor*
[✓ b.] *in the trash*
c. *in my desk*
d. *out the window*

1. *Which one of these is __not__ one of the 3 R's?*

   a. *recycle*
   b. *reuse*
   c. *resource*
   d. *reduce*

2. *Leachate is ...*

   a. *a step in recycling aluminum.*
   b. *drainage from a sanitary landfill.*
   c. *left-over material from a waste-to-energy incinerator.*
   d. *a very small worm that feeds on blood.*

3. *The people responsible for solid waste problems are ...*

   a. *manufacturers*
   b. *towns*
   c. *my family and me*
   d. *everyone*

4. *Renewable resources are raw materials that ...*

   a. *are capable of being broken down by microorganisms.*
   b. *are used once and then discarded.*
   c. *are naturally occurring and are constantly being replenished by nature.*
   d. *can be recycled into other things.*

5. *Which of the following __cannot__ be composted?*

   a. *tin cans*
   b. *kitchen scraps*
   c. *leaves*
   d. *grass clippings*

Waste Away Program

Home Booklet

Dear Parents:

Your child is working hard at school to tackle the trash problem. Please help by reading this booklet and sharing it with your family. Your interest and support will make a big difference. Thank you!

Vermont Institute of Natural Science
Post Office Box 86
Woodstock, VT 05091
802-457-2779

The Vermont Institute of Natural Science is a non-profit membership organization dedicated to protecting Vermont's environmental quality of life through education and research. Outreach programs are conducted for audiences of all ages throughout Vermont, while at the 77-acre VINS preserve in Woodstock, Vermont, members and visitors are welcome to visit the Vermont Raptor Center and walk the self-guided nature trails.

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Section 1

Background Information

"Garbage is only a raw product we are too stupid to use."

Arthur C. Clarke
Author

The amount of waste generated in the U.S. has doubled in the last fifty years. We now produce one billion pounds of trash each day, an equivalent of 100,000 garbage truck loads. If that many garbage trucks were lined up on a highway, the line would reach from Chicago to New York.

The cost of disposing of trash has doubled and even tripled in one year in some parts of this country. At six billion dollars per year, it is our nation's third largest expenditure.

Packaging contributes significantly to the waste problem. Additionally, large amounts of energy and natural resources are used in the manufacture of packaging. For example, in 1974, the Environmental Action Foundation found that the energy spent to produce the packaging used in McDonald's restaurants in a year was equal to the total amount of energy used by the cities of Boston, San Francisco, Washington, D.C. and Pittsburgh for a full year.

The ozone layer, which protects us from harmful ultraviolet radiation, is degenerating. Scientists tell us that this is largely as a result of chlorofluorocarbons (CFCs) being introduced into the environment. CFCs are given off in the production of polystyrene foam products such as Styrofoam cups, trays and egg cartons.

"Waste not, want not"

Benjamin Franklin

Wildlife is harmed by our wasteful habits. Animal habitats are lost to landfill sites and many animals are injured by human waste. For example, sea turtles often eat floating plastic bags which they mistake for jelly fish. The bags can block their intestines causing starvation.

Landfills are the destination of most of our trash. Old landfills often leak contaminants (leachate) into surface and ground water. If groundwater becomes contaminated, it is nearly impossible to purify. Existing landfills are rapidly filling, and new lined landfills are very costly to construct.

Incinerators can reduce the volume of solid waste and contribute to energy production. However, they are expensive to construct and, without elaborate emission controls, release pollutants such as acid gases, toxic heavy metals, dioxins and carbon monoxide into the air. The ash caught in pollution control devices is usually highly toxic.

Recycling makes sense! It reduces the amount of solid waste requiring disposal. It reduces the amount of energy needed to manufacture new products. Making an aluminum can from recycled metal uses 95 percent less energy than manufacturing that same can from raw bauxite. It reduces the pollution and destruction caused by obtaining new raw materials. It saves natural resources.

Composting makes sense! It saves land fill space. It reduces air and water pollution. It's a great fertilizer for garden and house plants.

Reducing and reusing makes sense! Reusing what we have and reducing our consumption of new products will create the least negative impact on our environment. (Even recycling causes some pollution and uses energy.)

Section 2

Waste in the Household

On an average, each person in the U.S. creates 3½ pounds of household trash each day. To see how your family members compare to the average, fill in the blanks.

Total weight of one week's trash (weigh on scale) : ________

Estimated weight of one day's trash (divide by 7):________

Estimated amount each family member produces per day (divide by number in family): ____________________________

How does your family compare to the average U.S. citizen?

Further analyze your trash by weighing each category below or estimating percentages.

Aluminum cans ______ Glass ______ Paper __________

Food waste ______ Plastic ______ Other _____________

With your family, brainstorm ways to reduce waste for each of the above categories. Some suggestions appear on page 10 of this booklet.

Household Hazardous Waste - Some Options

Household Toxin	Harmful Effects	Disposal Options	Alternatives
Paint Remover & Other Solvents	Short term: irritate and damage skin, eyes, lungs; cause nausea, poisoning. Long term: cause allergies, nervous system disorders; damage kidneys and lungs; see 1,2,3,4 in the key.	See A, B at bottom of chart.	No substitutes for most solvents; instead of paint remover, sand off old paint or use heat gun (wear goggles and mask); never use gasoline as a solvent.
Furniture & Shoe Polish	See Paint Remover & Other Solvents.	See A,B,C.	Polishes without tricloroethylene, methylene chloride, or nitrobenzene; many recipes available including 1 pint mineral oil with 1 tsp lemon oil (may strip finish).
Oil based Paints (including spray paint)	Irritate eyes, skin, lungs; cause headaches, nausea; require solvents to clean up tools; see 1,3,4.	See A,B,C,E.	Latex paint.
Drain, Oven, and Toilet Cleaners	Some kinds can burn skin; mixing ammonia and bleach creates deadly gas; see 1,2,4.	Drain & toilet cleaners: A, D. Oven cleaners: A, B.	Prevent clogged drains by pouring boiling water down drain weekly; clean with vinegar, baking soda, boiling water; use plunger; clean toilets & ovens with salt, baking soda, water & elbow grease; use small dish of ammonia standing overnite to loosen stains.
Window Cleaners, Ammonia Cleaners, Bleach, Powdered Cleansers	Some kinds can burn skin; mixing ammonia and bleach creates deadly gas; see 1,2,4.	Powdered cleansers, window cleaners: C. Ammonia cleaners: A, B, D.	Baking soda instead of powdered cleansers & ammonia cleaners; non-chlorinated powder bleach instead of liquid bleach, try borax; use 2 tbsp vinegar & 1 qt water instead of window cleaners.

Household Hazardous Waste - Some Options

Household Toxin	Harmful Effects	Disposal Options	Alternatives
Mothballs	Poisonous fumes cause headaches, nausea; see 1,2,3,4.	See A, B, E. Never D !!	Cedar chips; sachets of herbs such as lavender, bay.
Pesticides; Herbicides Fungicides Insecticides	Can be absorbed through skin and by breathing; cause headaches, nausea, fatigue, tension; see 1,2,3,4.	See A,B,E. Never D !! Only use A for old, banned or restricted pesticides.	Soapy water to kill aphids, mites; garlic spray or citronella to repel many insects.
Used Motor Oil & Car Batteries	Some poisons in used oil may be absorbed through skin; battery acid can burn skin, eyes; see 1,2,3,4 for oil; see 4 for acid.	Oil: recycle at gas station or at store, or A; never C, D. Battery (including battery acid): return to place of purchase, or A.	No alternatives available; wear gloves & goggles when handling.

Key to Letters and Numbers

1 Deadly if swallowed
2 May cause cancer
3 Flammable
4 Causes air or water pollution

Check first with your Solid Waste District. If no information is available locally, then follow the guidlines for each toxin.

A Turn in on toxic waste collection day.
B Use it all up, then dispose of container as in step C, below.
C Wrap container in lots of newspaper, put in plastic bag, and put out with the trash.
D Dilute leftovers with lots of water, then pour down sink. Do not do this if you have a septic tank!
E Share leftovers with neighbors.

IN CASE OF EMERGENCY CALL YOUR STATE POISON CENTER

The above chart was adapted, with permission, from the April 1988 Ranger Rick Magazine, a publication of the National Wildlife Federation © 1988 NWF

Section 3

Scavenger Hunt

The products we buy and the packaging they come in affect the quality and quantity of the waste we generate.

Go to a department store and/or supermarket and complete the following scavenger hunt with your family. Find and describe one or two examples for each. In some instances you will be asked to find substitutes which could fulfill the same purpose while generating less waste.

Products which are not biodegradable.

Examples: ______________________________

Substitutes: ______________________________

Products made from a nonrenewable resource.

Examples: ______________________________

Substitutes: ______________________________

Products which are overpackaged.

Examples: ______________________________

Substitutes: ______________________________

A nonreuseable item (such as a throw-away razor).

Examples: ______________________________

Substitutes: ______________________________

Products you might buy because advertisement made them attractive. Examples: ______________________

A product that no one really needs for any significant purpose you can detect. Example: ______________

A product you need and know you can use for a very long time without having to replace it.

Examples: ______________________________

Fast Food Throw-Aways

Disposable packaging, a modern day phenomenon, consumes a tremendous share of the world's resources and accounts for much of our consumer waste. Fast food restaurants offer a convenience but often produce a vast amount of packaging which is almost immediately thrown away. In addition to packaging, these restaurants provide other throw-away items such as cups and eating utensils.

Try out this activity the next time you are in a fast food establishment.

Using this form, fill in the appropriate column.

1. Name the throw-away item received.

2. Write down the material the item was made from.

3. Is it biodegradeable?

4. Does the item come from a renewable resource?

5. Could the item be easily recycled?

Item	Resource	y/n	y/n	y/n

Think about the waste produced and the resources consumed.

Section 4

The Family Contract

Please discuss the 3 R's (described below) with your family. Decide together ways you can REDUCE, REUSE and RECYCLE and then fill out the 3 R's Family Contract found on the next page. (Hint: don't take on too much all at once. Habits are difficult to change. You can always revise your agreement later.)

REDUCE: Buy durable, repairable products. Buy fewer disposable items. Buy items with minimal packaging. Avoid eating at carry-out restaurants which over-package food , or try asking the restaurant for less wrapping. Buy food in bulk and store in glass jars. Reduce purchases of nonrecyclable items. Request "no bag" for small purchases. Use your library instead of buying all your books.

REUSE: Use cloth kitchen towels and cloth napkins (save on laundry by giving family members their own napkin rings). Reuse small plastic bags, glass jars or plastic containers for left over food and grocery bags for trash. Carry your own coffee mug. Give outgrown clothes and unwanted items to charities. Write notes on used envelopes and scrap paper. Use comics for wrapping paper. Return extra hangers to dry cleaners. Compost your organic waste. Try to repair rather than replace broken appliances.

RECYCLE: Buy recycled and recyclable products. Find out where there is recycling in your community or near your place of work. Find out how to start a recycling center if there isn't one near you. Provide separate containers for aluminum, glass and newspaper near your trash can. Some recycling collection centers accept mixed paper, plastic beverage containers, and bimetal or soup-type cans. Ask for paper bags (instead of plastic) as these are more easily recycled. Reduce junk mail by up to 75 percent by writing to Mail Preference Service, Direct Marketing Association, 6 East 43rd St., New York, NY 10017 and asking to be eliminated from all mailing lists in the future. Write or call companies directly to be removed from existing mailing lists. (Many companies have toll-free numbers and postage-paid envelopes.)

Please post in a visible location.

We the undersigned agree to practice the three R's:

REDUCE, REUSE, & RECYCLE!

Our family agrees to work together to reduce our production of trash by doing the following things:

____

____

____

____

____

____

____

____

Signed & Dated:

____

____

____

____

____

VINS WASTE AWAY PROGRAM

Section 5

Other Things to Do

Educate yourselves and others. Speak up at town meetings and PTO meetings.

Support recycling projects in your Community. Join recycling groups and environmental organizations.

Write your local government, state government or federal legislators to encourage recycling.

Write an editorial for your local paper encouraging others to reduce, reuse and recycle.

Write manufacturers about their packaging.

For More Information, contact your State's solid waste manager or solid waste district manager.

NUKE
Hold on to your hard hat Mr. Cleanup-You're about to see a new monument to modern man!
In a New York landfill?? Yer kiddin'!
There it is!
Uh...what is it?
Well it's not finished but it's gonna be a pyramid--bigger than the great pyramids of Egypt!
A pyramid of trash?
People will stare in wonder for the next thousand years
Yeah, the styrene and the pampers really last, don't they?
Bert Dodson

The above cartoon is copied with permission from: Dodson, Bert. *NUKE: A Book of Cartoons.* Jefferson, N.C., McFarland Publishing, 1988. ISBN 0-899-50327-6

GLOSSARY

Aluminum: A light silvery-white metal made from bauxite ore that is nonmagnetic.

Aerobic: Living only in the presence of free oxygen.

Anaerobic: Living in the absence of free oxygen.

Bauxite: The principal source of aluminum, containing alumina and impurities.

Bimetal: Composed of two different metals that are not fused together into an alloy.

Biodegradable: Capable of being broken down naturally by microorganisms into simple, stable compounds (e.g., carbon dioxide and water). Most organic wastes are biodegradable.

Bottle Bill: A law requiring deposits on beverage containers, like aluminum cans and plastic bottles. More accurately called a beverage container deposit law.

Bottom Ash: Residue from burning which collects at the bottom of the incineration chamber.

CFCs: Chlorofluorocarbon, a gas used as a blowing agent in the production of polystyrene. Is causing depletion of the ozone layer.

Cellulose: A chemical compound that is the chief component of plant tissues and fibers and is used in the manufacture of paper, textiles, and cellulose wrap.

Combustible: Capable of being burned.

Compostable: Having the ability to be decomposed by microorganisms and converted into humus.

Composting: The natural conversion of most organic materials into humus by the activity of microorganisms, and an effective solid waste management technique for reducing the organic portion of waste.

Consumer: A person who buys goods or services for his own needs and not for resale or for production of other goods for resale (as opposed to a producer).

Conversion: Changing solid waste through chemical or physical processes into some other material like energy or soil. Composting and burning waste are both conversion processes.

Cullet: Scrap glass broken up into small (dime-size), uniform pieces.

Decomposition: The breakdown of organic waste materials by bacteria and fungi into simpler components (e.g., carbon dioxide, water and inorganic solids).

Degradable: Capable of being broken down into smaller components.

Dioxins: Highly toxic compounds of carbon, hydrogen, oxygen and chlorine created in the burning of solid wastes containing commonly found chlorine compounds (e.g., salt, bleached paper and plastics).

Disposable: Designed to be thrown away after use.

Dump: An open and unmanaged disposal site (used prior to sanitary landfills) where waste materials are burned, left to decompose, rust or simply remain.

Ecology: The scientific study of the relations of living things to one another and to their environment.

Energy Recovery: Technologies which produce energy from solid wastes, including (a) capturing the heat energy produced by mass-burning mixed solid wastes and converting it to electricity, (b) producing an industrial fuel from mixed solid wastes, and (c) extracting methane from landfills for conversion and use as natural gas.

Energy Resources: Resources used as sources of power and/or heat generation including renewable resources (e.g., wood, hydro, biomass, etc.) and nonrenewable resources (e.g., coal, petroleum, natural gas, uranium, etc.).

Environment: The circumstances and conditions that surround living organisms, including soil, water, buildings, plants and animals.

Fly Ash: The ash, produced in an incinerator, which floats and is collected at a high point in the incinerator.

Fossil Fuel: Naturally occurring nonrenewable hydrocarbon (e.g., coal, crude oil or natural gas) formed over extremely long periods of time from fossil remains or organic materials and used to produce energy.

Garbage: Originally referring to food wastes, but now generally including all waste considered worthless and thrown away. Another word for solid waste, especially household waste.

Glass: A chemically inert, impermeable, transparent, nonporous, odorless material produced primarily from silica, soda ash, limestone and feldspar.

Greenhouse Effect: The trapping of the earth's heat by accumulated atmospheric gasses.

Groundwater: Water found below the surface of the earth. Ground water supplies wells.

Hazardous Waste: Waste materials which are dangerous to living things or the environment because they have one or more of the following characteristics: (a) poisonous, (b) explosive, (c) capable of dissolving flesh or metal, (d) readily burnable, (e) carriers of diseases, or (f) radioactive.

Household Hazardous Waste: Waste materials commonly used in small quantities in the home which have some or all of the characteristics of hazardous waste and should not be disposed of in the same manner as other solid waste.

Humus: The organic part of soil, resulting from the decay of plant or animal matter.

Illegal Dumping: The illegal disposal of solid waste in any place not authorized to accept waste material; usually done to avoid tipping fees at landfills.

Incinerator: A facility designed to reduce the volume of waste by burning it.

Inorganic: Composed of matter other than animal or plant; most inorganic compounds do not contain carbon, do not biodegrade and are derived from mineral sources.

Leachate: A liquid that has percolated through solid waste and/or been generated by solid waste decomposition and has bacteria and poisonous materials; must be collected and treated to prevent it from contaminating ground and surface water supplies.

Litter: Waste materials which are carelessly discarded in an inappropriate place or which accidentally escape waste-handling systems.

Methane: A colorless, odorless, flammable gaseous hydrocarbon (CH4) present in natural gas and formed by the decomposition of vegetable matter; usable as fuel.

Mixed Paper: Waste paper of various kinds and quality, including manilla folders, construction paper and newspaper.

Natural: Anything directly made from materials in nature.

Nonrenewable Resources: Natural materials which, because of their scarcity, the great length of time required to form them and their rapid depletion, are considered finite (e.g., natural gas, oil and minerals).

Organic: Derived from living organisms or containing carbon compounds.

Ozone Layer: A layer of ozone molecules (O_3), in the stratosphere, which shields out much of the sun's ultraviolet light.

Photodegradable: Capable of being broken down by ultraviolet light into smaller components.

Planned Obsolescence: A marketing concept developed to increase production and sales by creating products which must be replaced frequently (either because they have gone out of style or are designed to break easily or be disposed of).

Plastic: Any one of many human-made materials consisting of carbon in combination with hydrogen, oxygen, nitrogen, other organic elements and inorganic elements which are produced by polymerization (linking together small, single chemical units). Can be molded, extruded or cast into various shapes and films or drawn into filaments and used as textile fibers.

Pollution: Harmful substances deposited in air, in water or on land and leading to a state of dirtiness, impurity or unhealthfulness.

Pulp: A cellulose fiber and water combination used to make paper. Can be made from virgin wood, recycled paper or other cellulose-based plants.

Reclamation -- The restoration to usefulness or productivity of materials found in the waste stream.

Recyclable: The ability to be used again or to be made into a new or similar product

Recycle: To pass through a cycle again; to collect and reprocess manufactured materials for reuse either in the same form or as part of a different product.

Recycling Center: A site where manufactured materials such as glass, newsprint or aluminum are collected and sold for reprocessing.

Reduce: To lessen in extent, amount, number or other quantity.

Refillable Bottle: An energy-saving glass beverage container designed not only to be returned for deposit but washed and refilled with beverage for resale.

Refuse-derived Fuel: Fuel that is made from waste materials.

Renewable Resources: Naturally occurring raw materials or forms of energy derived from an endless or cyclical source, such as the sun, wind, falling water (hydroelectric), plants and animals.

Resource Recovery: Use of technology to burn mixed solid waste and produce energy and/or refuse-derived fuel. May involve mechanical separation of recyclables before or after burning.

Returnable Container: A container able to be returned to a vendor, usually with a deposit payable to the consumer upon return, usually refers to beverage containers.

Reusable: Capable of being used again either as is or by repairing it.

Reuse: To extend the life of an item by repairing or modifying it, or by creating new uses for it.

Sanitary Landfill: A specially located and engineered site for the land disposal of solid waste. Designed to minimize public health and safety threats and to prevent litter, rodents, open burning, pollution of ground and surface water, etc. Wastes are compacted and covered daily with several inches of soil.

Sewage: Liquid and solid wastes in sewers and drains.

Solid Waste: Any unwanted material, either solid or semi solid, that is discarded from households, industries or communities. This may include trash, appliances, cars, human waste, ashes, construction debris, yard clippings, industrial chemicals and by-products, etc.

Solid Waste Management: The controlling, handling, processing and disposal of all refuse.

Source Separation: The sorting out of recyclable materials into specific categories (e.g., paper, corrugated cardboard, aluminum, and glass) by the person who last uses the materials.

Synthetic: Produced by humans through chemical synthesis rather than produced by nature.

Tipping Fee: Disposal fee paid at a landfill or incinerator.

Toxic: Poisonous.

Toxin: A poisonous substance.

Transfer Station: A place where solid waste is stored, sometimes processed or compacted, and when sufficient quantity has accumulated, is reloaded into large trucks for more cost-efficient transportation to landfills, recycling dealers and resource recovery sites.

Trash: Another word for solid waste.

Virgin Material: Any basic material for industrial processes which has not previously been used (e.g., trees, iron ore, silica, crude oil, bauxite, etc.).

Waste Stream: All the waste material output of an area, location or facility. All materials and resources being thrown away.

Waste-to-Energy Incineration: A method of solid waste incineration which uses the produced heat to create steam to heat buildings, run machinery or generate electricity.

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